The Petroleum Situation

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DO WE HAVE ANOTHER OIL CRISIS?

With no apparent end in sight to the Iran/Iraq conflict, the world is once again facing the specter of an oil crisis. Oil production before the conflict was estimated by most analysts at 1.5 million barrels per day from Iran and 3.5 million from Iraq. Reducing this production to zero, or virtually zero, yields an alarmingly parallel situation to that of the 1978/79 Iranian Revolution. The major differences between then and now are that oil stocks in September, 1980 were significantly higher than in December, 1978, and that in December, 1978, economic recession was only being discussed, while in September, 1980 it was an unpleasant reality. In 1978, the general tendency was to underestimate the impact of the Iranian Revolution on oil supplies and prices. Will the effect of this war be similarly underestimated? In this issue, we will try to cover the data available and to set the background against which the oil market will operate. In doing so, we will address the following topics:

- What has been happening to demand?
- What has been happening to oil supply?
- What is the approximate gap resulting from the conflict?

First, what has happened to oil demand since the 1978 Iranian problem?

DEMAND CHANGE: 1978-1980

(Approximate Change in Thousand Barrels per Day)

	Four European*	Japan	U.S.A.
Motor Gasoline	+ 70	+ 3	- 730
Middle Distillate	-120	+ 22	- 431
Heavy Fuel	–	-200	- 390
Total Oil	-120	-190	-1750
Annual Percent Change in Total Oil	- 0.9	- 1.7	- 4.5

*France, Germany, Italy, and the U.K.

Motor gasoline demand has continued to climb, albeit much more slowly, in the four larger European states and Japan. The U.S., as has been well publicized, has exhibited a significant and welcome decline in demand. The situation in middle distillate and heavy fuel is interesting, with distillate demand declining in Europe and heavy fuel demand declining in Japan, while the U.S. demand for both fuels has declined significantly. Since the U.S. consumes much more oil per capita than any other country, it should have greater scope for saving, and this is indicated by the numbers. Another factor that contributed to a difference among responses to the 1979 price run-up is the big variation of oil consumption patterns among these nations.

OIL CONSUMPTION PATTERNS

(As a Percentage of Total)

	France	West Germany	Italy	U.K.	Japan	U.S.
Motor Gasoline	11	17	12	18	12	39
Middle Distillate	32	42	27	23	17	26
Heavy Fuel	19	16	39	30	36	15
Other	38	25	22	29	35	20
	100	100	100	100	100	100

The table above shows this difference, with current consumption of individual products being expressed as a percentage of total consumption. The relatively greater significance of gasoline in the U.S. demand pattern is well known. The high proportion of middle distillate in Germany, however, is less well known.

This covers demand by the major OECD states, and the trend for the other OECD states has historically followed the same general trends.

For the rest of the world—the Less Developed Countries (LDCs) and the Centrally Planned Economies (CPEs)—the story is not the same. Data takes longer to surface for the LDCs in particular, but, based on current estimates, the oil consumption for the world as a whole will be 2.1 million barrels a day more in 1980 than in 1978, an annualized climb of 1.7 percent. The LDC consumption apparently has risen by more than this—2.3 million barrels a day, which is a 10 percent annual rise.

OIL CONSUMPTION PATTERN

(Million Barrels per Day)

	1978	1980	Annual % Change
To Stock	-0.4	0.6	
OECD	39.4	37.0	- 3.1
LDCs	11.0	13.3	+10.0
Communist Bloc	12.8	14.0	+ 4.6
Production	62.8	64.9	+ 1.7

For 1981, we were anticipating a small climb in OECD consumption, together with significant increases for LDCs and the CPEs. Combined OECD and LDC demand is expected to be up by 800 thousand barrels per day, and net exports from the Communist countries will show a small drop to around 1 million barrels per day.

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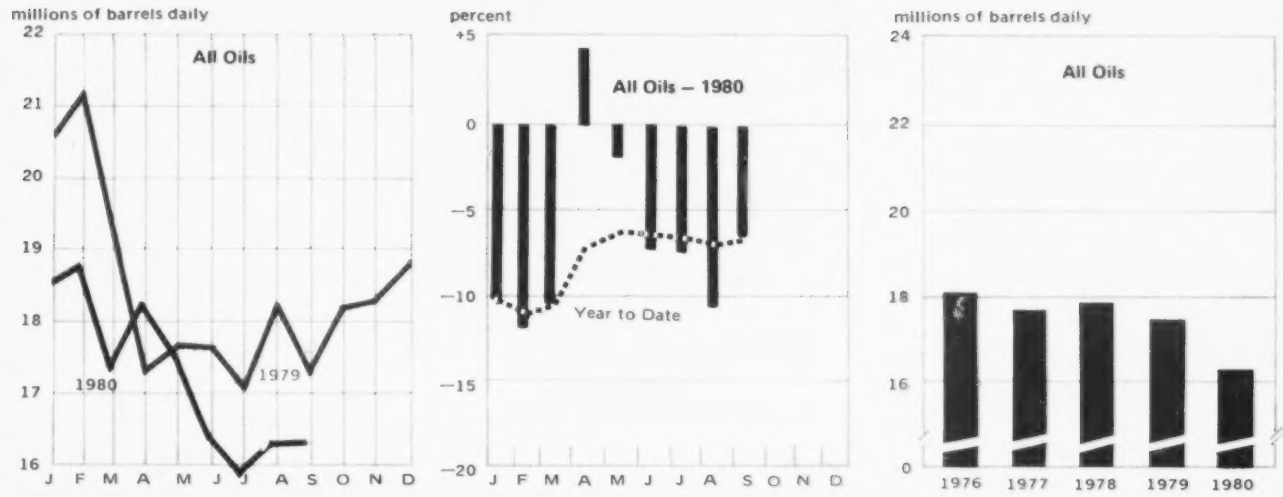
Demand For Petroleum Products . . .



This leads to prospects for oil supply. Non-OPEC oil production has been climbing significantly over the last four years. What will happen in 1981? In the U.S., with the enormous jump in drilling rates and the almost daily announcement of some new find, one would expect an optimistic outlook. But even with the jump in North Slope crude this year, we expect 1980 U.S. production, including gas liquids, to only equal last year's. The next few years will see a decline in production of U.S. oil of about 200 thousand barrels per day per year. As commented before, if it were not for the ill-conceived nature of U.S. leasing policy, this could have been a more optimistic story. We still believe that an optimal leasing policy could have added some two million barrels per day of oil equivalent by 1990.

North Sea crude is about 1.8 million barrels per day, short of the peak of around four million barrels per day it is expected to reach by 1984-85, while Mexico is 600-800 thousand barrels per day short of its government-established ceiling and is expected to reach it in 1981. There are small amounts to come from Peru, Egypt, parts of Africa and others. In the next year, including Mexico and the North Sea, this increase in non-OPEC/non-U.S. crude will total about 1.2 million barrels per day.

When looking at OPEC, we must divide it into two groups. The first represents the spenders—those states that can use their oil revenue internally and, hence, whose production is going to be more market-oriented. The second group is the savers, who can't efficiently use all their oil revenues. Of the major spenders, we would expect Nigeria and Venezuela between them to raise production in 1981 by about 500 thousand barrels per day over 1980 levels. Other spenders will stay about static. Of the remaining OPEC states, Libya is, of course, difficult to forecast, but we have assumed a small rise.

The next table shows our supply forecast, excluding the Arabian Gulf, and illustrates the climb in non-OPEC production. For 1981, our projection is for a total of 22.5 million barrels per day.

NON-PERSIAN GULF OIL SUPPLY FORECAST – 1981
(INCLUDING NGLs)
(Million Barrels per Day)

	1978 Actual	1979 Actual	1980 Forecast	1981 Forecast
U.S.A.	10.3	10.2	10.2	10.0
Canada	1.6	1.8	1.7	1.7
Mexico	1.3	1.6	2.1	2.6
North Sea	1.5	2.1	2.3	2.9
Other Non-OPEC	4.1	4.3	5.0	5.3
Total Non-OPEC	18.8	20.0	21.3	22.5
Non-P.G. OPEC	9.5	10.1	9.1	9.6
Total	28.3	30.1	30.4	32.1
Communist Exports	1.0	1.0	1.2	1.0
Oil Supply Excluding P.G.	29.3	31.1	31.6	33.1

This leaves us with an estimated Arabian Gulf requirement, compared with actual 1978 and 1979, as shown in the following table. Where could this oil come from? The production from the "non-combatant" states was expected to be 14.4 million barrels per day, and this leaves a need of 3.5 million from Iraq, Iran and stock-drawdown.

PERSIAN GULF OIL PRODUCTION
(Million Barrels per Day)

	1978	1980	1981
"Requirement"	21.0	18.6	17.9
Non-Combatant Production			
Saudi Arabia	8.6	10.4	10.0
Kuwait	2.2	2.1	2.1
United Arab Emirates	1.9	1.7	1.8
Qatar	0.5	0.5	0.5
	13.1	14.6	14.4
			Need:
Iraq	2.6	2.6	3.5
Iran	5.2	1.3	
	7.8	3.9	

Let's not underestimate the effect that stocks can have, particularly in the short term. Their greatest significance, however, is probably the effect they are perceived to have. Current oil stocks are at a record high, as we showed last month. There were some 600 million

barrels of oil considered surplus to normal needs as of the end of September.

What, then, is the effect of the conflict on supply? We have considered two possible conflict scenarios. The first assumes the fighting ends in December, with production from Iran/Iraq reaching about 3.5 million barrels per day in the third quarter of 1981. Our estimate of the effect that this would have on stocks is shown below.

ESTIMATED STOCK DRAWDOWN DUE TO IRAN-IRAQ CONFLICT
(ASSUMING WAR ENDS IN DECEMBER)
(Million Barrels per Day)

	October	November	December	1981:1	1981:2
Iran	0.0	0.0	0.0	0.0	0.7
Iraq					
North	0.0	0.0	0.6	1.0	1.5
South	0.0	0.0	0.0	0.5	1.0
Total Loss in Exports	4.0	4.0	3.4	2.5	0.8
Extra Production From Other OPEC	1.0	1.0	1.0	0.5	0.5
Net Loss	3.0	3.0	2.4	2.0	0.3
Stock Drawdown (Million Barrels)	93	90	74	180	27
Cumulative	93	183	257	437	464

As you can see, 464 million of the 600 million barrels are used.

The second scenario assumes that the conflict continues beyond the turn of the year. The impliction of this is that the stocks will not be able to cope with the problem. It is obvious that the result could be a further dramatic OPEC price run-up.

Currently, there is pressure on the IEA states to announce their readiness to use strategic stocks and to implement conservation measures. Implementation of such measures could have a big effect on the oil supply situation.

Colin P. Carter

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

The production of crude by the lower 48 states was at 99.4 percent of the September, 1979 level. This was due to increased production in California and Louisiana, a sharp decline in Texas and roughly flat production elsewhere. Natural gas liquids production showed a jump for the first month in a long time. Given that demand is still lower than in 1979, imports were well down, with imported crude oil taking a larger share of the drop than product.

DEMAND

Gasoline demand is now being compared with the "post-crisis" months of 1979, when the impact of the Iranian crisis had already been fully felt. The 2 percent drop in demand compared with these months is quite significant. The continued decline in demand for this and other fuels is, of course, partly attributable to the very sharp recession. Time will tell us the full significance of the general price response.

STOCKS

The Iran/Iraq conflict did not hit until the end of September, and we would not expect to see any impact of the war on recorded stocks until the end of November. The stock increase of 7.5 million barrels in September continued to result in record levels for most products, and particularly for crude oil.

PRICES

Because of the large stock overhang, product prices, with the exception of residual fuel, continued a slow downward drift. Since residual fuel had reached exceptionally depressed prices, some recovery merely represented a return toward normalcy. The margin for the Type 2 (low conversion) refiner is still negative by more than two dollars before operating costs, and the small refiner bias, at 96 cents, does not eliminate this negative margin.

U.S. Wholesale Prices . . .
BY MONTHS
cents per gallon

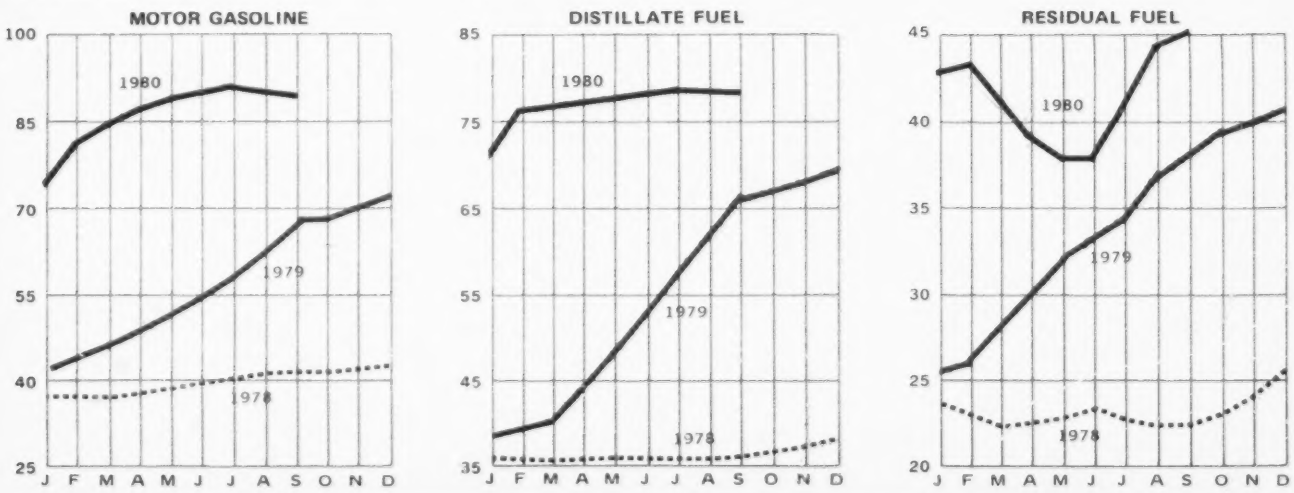


TABLE 1

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	Price $/BBL	Percent Share of Total Crude	Price $/BBL	Percent Share of Total Crude
	AUGUST 1980		AUGUST 1979	
Lower Tier	7.15	8.6	6.58	13.0
Upper Tier	15.14	12.4	13.86	18.6
Alaska	25.89	10.3	21.38	7.5
Stripper	33.98	14.0	25.07	10.4
NPR	33.77	0.6	21.16	0.7
Newly Discovered	37.82	3.0	28.81	0.7
Heavy Oil/Decontrolled	33.24	11.5	16.90	0.4
Tertiary	33.22	0.3	16.74	–
Domestic Composite	24.98	60.7	15.73	51.3
Imported	34.44	39.3	23.98	48.7
Composite	**28.70**	**100.0**	**19.75**	**100.0**
"Entitlements" Penalty	0.17	–	0.10	–
Refiner Acquisition Cost	28.87	–	19.85	–

Sources: U.S. Department of Energy
Chase Manhattan Bank

The refiner average acquisition cost of crude was actually two cents per barrel lower in August than in July, reflecting a small reduction in foreign crude cost and a significant reduction in Alaskan crude. This last change reflects the changes in entitlement treatment for controlled North Slope crude and has led to yet another revision of the manner in which this crude is handled in the entitlement program.

TABLE 2

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1980 SEPT.	1980 AUG.	1980 JULY	1979 SEPT.
Motor Gasoline	89.4	90.4	91.3	66.8
Kerosine	80.4	80.6	80.8	67.8
Distillate Fuel	78.5	78.6	78.6	66.0
Residual Fuel	45.1	44.1	40.9	38.3

Source: Independent Petroleum Association of America

TABLE 3

SPREAD BETWEEN GROSS REVENUE AND CRUDE OIL COST

($/Barrel)

	Type 1 Refinery	Type 2 Refinery
1975	1.21	0.10
1976	2.01	0.31
1977	2.49	0.94
1978	2.39	0.10
1979	4.19	0.84
May 1980	4.20	–3.05
June 1980	3.72	–3.73
July 1980	4.17	–2.92
August 1980	4.22	–2.30

Note: Spread figures are calculated as follows:

	Motor Gasoline	Kerosine	Distillate Fuel	Residual Fuel
Type 1	50%	8%	25%	17%
Type 2	21%	8%	19%	52%

	SEPTEMBER 1980 Thous. Bbls. Daily	SEPTEMBER 1979 Thous. Bbls. Daily	Change – % –	3 MOS. AVERAGE 1980 Thous. Bbls. Daily	3 MOS. AVERAGE 1979 Thous. Bbls. Daily	Change – % –	YEAR TO DATE AVERAGE 1980 Thous. Bbls. Daily	YEAR TO DATE AVERAGE 1979 Thous. Bbls. Daily	Change – % –
PRIMARY DEMAND									
Motor Gasoline	6,742	6,878	– 2.0	6,753	7,022	– 3.8	6,641	7,098	– 6.4
(Unleaded)*	3,215	2,815	14.2	3,183	2,858	11.3	3,039	2,773	9.6
Jet Fuel	973	1,105	– 11.9	1,054	1,099	– 4.1	1,066	1,074	– 0.7
Kerosine	182	160	13.8	131	150	– 12.3	157	190	– 17.4
Distillate Fuel	2,493	2,659	– 6.2	2,375	2,661	– 10.7	2,790	3,283	– 15.0
Residual Fuel	2,174	2,617	– 16.9	2,240	2,515	– 10.9	2,480	2,826	– 12.2
All Other	3,766	4,025	– 6.4	3,609	4,151	– 13.1	4,105	4,067	0.9
Total Domestic Demand	16,330	17,444	– 6.4	16,163	17,597	– 8.1	17,240	18,539	– 7.0
Exports	489	416	17.5	522	457	14.1	527	472	11.7
Total Demand	16,819	17,860	– 5.8	16,685	18,054	– 7.6	17,767	19,011	– 6.5
New Supply									
Domestic	10,744	10,709	0.3	10,888	10,807	0.8	10,849	10,693	1.5
Crude Oil	8,596	8,466	1.5	8,634	8,507	1.5	8,663	8,510	1.8
Natural Gas Liquids	1,594	1,565	1.9	1,581	1,568	0.8	1,597	1,566	2.0
Other Supply	554	678	– 18.3	674	732	– 7.9	589	975	– 39.6
Imports	6,311	8,006	– 21.2	6,105	8,283	– 26.3	6,917	8,311	– 16.8
Crude Oil	4,948	6,410	– 22.8	4,731	6,512	– 27.4	5,369	6,405	– 16.2
Refined Products	1,363	1,596	14.6	1,374	1,771	– 22.4	1,548	1,906	– 18.8
Residual Fuel	907	979	– 7.4	853	1,023	– 16.6	899	1,161	– 22.5
All Other	456	617	– 26.1	521	748	– 30.3	649	745	– 13.0
Total New Supply	17,055	18,715	– 8.9	16,993	19,090	– 11.0	17,766	19,004	– 6.5
Crude Oil Refined	13,228	14,595	– 9.4	13,078	15,057	– 13.1	13,493	14,715	– 8.3
Stock Change	236	855	–	308	1,036	–	–1	–7	–
Stocks – End of Month in Million Barrels									
Gasoline	255	230	11.0						
Jet Fuel	43	32	33.0						
Kerosine	13	15	– 9.1						
Distillate Fuel	233	220	5.7						
Residual Fuel	92	88	4.4						
All Other	307	308	0.5						
Total Products	942	893	5.5						
Crude Oil	393	324	21.2						
Total – All Oils	1,335	1,217	9.7						

Totals may not add due to rounding
*Included in motor gasoline

Sources: *American Petroleum Institute*
Chase Manhattan Bank
Department of Energy

The Petroleum Situation

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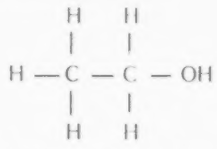
GASOHOL — PANACEA?

Gasohol is the popular name for a fuel mixture of gasoline and ethyl alcohol (ethanol). Mixed in a proportion of 90 percent gasoline and 10 percent alcohol, this blend can be burned in an internal combustion engine without modification. The chemical structure of ethanol —C_2H_5OH — is shown below.



Methanol, another member of the alcohol group, will be discussed at a later date. Here we focus on ethanol — the alcohol fuel of current interest and controversy.

FEEDSTOCKS

A wide variety of organic materials containing carbohydrates can serve as raw materials for ethanol production. The major groups of feedstocks are: (1) starch crops, including corn, grain sorghum and root plants, (2) sugar crops such as sugar cane, beets and molasses; (3) other biomass such as wood, wood wastes and farm residues. In the United States, corn is the preferred feedstock because of its superior ethanol yield, valuable by-products, and its storability and availability. Agricultural waste products are also important feedstocks.

PROCESS

Ethanol is produced from materials whose carbohydrate (starch or sugar) content can be fermented. This yields a dilute alcohol solution, which is distilled to produce a highly concentrated (greater than 95%) ethanol solution. In the traditional "batch" method, still prevalent, the feedstock and water is put into a large vat. The starch in the grain is liquefied and converted to glucose by enzymes. In the fermentation step, yeasts feed on the glucose, changing it to alcohol and carbon dioxide. The process ends in 30 to 70 hours when the alcohol content reaches 8 percent to 10 percent, killing the yeasts. The resulting "beer" is drained off and the alcohol is distilled out. For every gallon of ethanol, the process also yields 6 pounds of carbon dioxide and 12-13 pounds of stillage (a residue of dissolved proteins, waste solids and water). In a typical process, one bushel of corn will yield 2½ gallons of 200 proof (100 percent) anhydrous ethanol, plus 17 pounds of distillers dried grain (DDG) — digestible protein which can be used as a feed for cattle. Ethanol plants vary in size from pot stills on farms to commercial facilities with capacities up to 55 million gallons a year. Even the largest plants, however, compare in size to only a small oil refinery of 4,000 barrels a day.

FUEL CHARACTERISTICS

However glamorous gasohol is to the public, alcohol is an old fuel. Henry Ford built the Model T with an adjustable carburetor so that it could run on alcohol, gasoline or any mixture of the two. Use of ethanol in diesel engines, however, lowers the quality of the diesel fuel.

Interestingly, although ethanol contains only two-thirds the BTUs contained in gasoline, ethanol combusts more efficiently. As a result, older American cars get better performance and mileage when they run on gasohol, while those produced since 1974 perform better when using gasoline. More impressively, gasohol raises octane rating by 3 points, thereby reducing engine knock. It is therefore an attractive octane booster in lieu of lead or other competing gasoline additives. Because it requires less air for burning than gasoline, gasohol produces a dramatic one-third reduction of carbon monoxide emissions and a lesser reduction of hydrocarbons and NOX (oxides of nitrogen) emissions from older cars. On the minus side, alcohol-gasoline blends produce aldehydes which, at high altitudes, contribute to photochemical pollutants. They may also have a slight erosive effect on plastic fuel system components, and sometimes cause "vapor lock" in hot weather.

PRODUCTION

Current production of motor-fuel ethanol is 100 million gallons in 1980 (supporting gasohol use of 1 billion gallons), just one-tenth of one percent of the 110 billion gallons of gasoline the nation consumed. In 1979, the Department of Energy estimated that production of non-beverage alcohol could be raised to 600 million gallons by 1985, still a mere 40,000 barrels a day or 0.4 percent of imports. Title II of The Energy Security Act 1980, titled the Biomass and Alcohol Fuels Act of 1980, set a target of one billion gallons (60,000 barrels a day) of ethanol production by December 31, 1982 and 10 percent of gasoline consumption in 1990, which would be approximately 10 billion gallons.

It is important to realize that the 1982 ethanol-production target would burn up the equivalent of 7 percent of normal corn production of 6 billion bushels, and in 1990, a whopping 50 percent of a normal corn crop or its equivalent in other feedstocks. Alternatively, grain planting would have to be expanded to a maximum extent.

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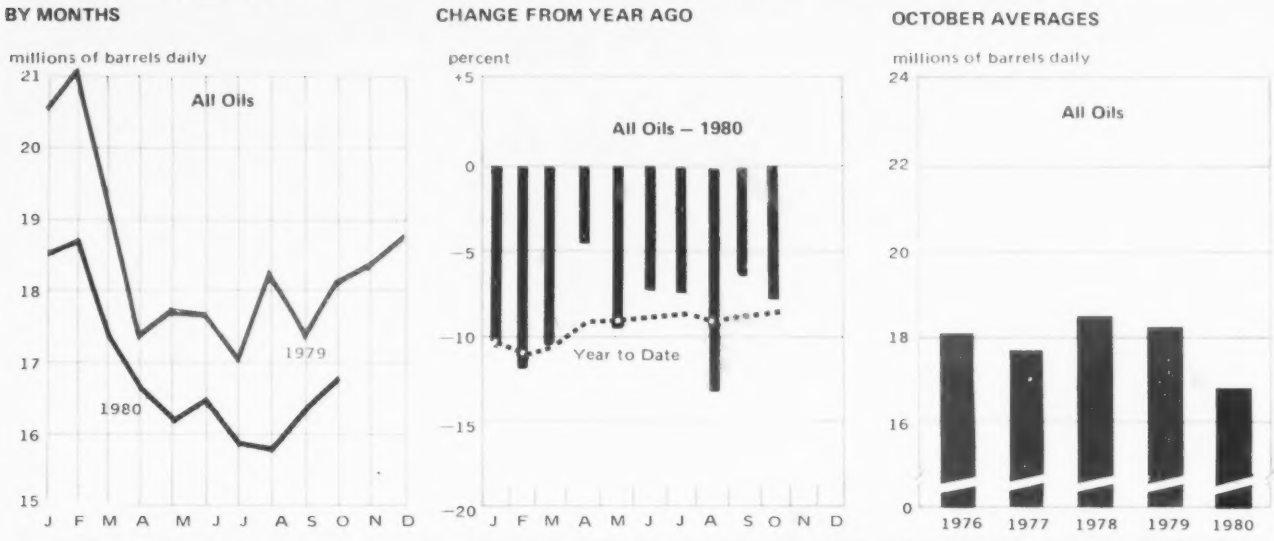
Demand For Petroleum Products . . .



THE ECONOMICS

The cost of producing ethanol is dependent upon three factors:

- cost of the raw material (e.g., grain feedstocks),
- processing cost, including initial capital, process energy, labor and overhead, and
- the amount of offsetting income realized in the sale of process by-products (DDG) for feedstock.

The economics of ethanol can vary widely. By far the most important and unpredictable factor is the cost of feedstock. With corn at $3.00 a bushel, feedstock cost translates to $1.20 a gallon of ethanol. Capital (including return) and fuel each account for 30 cents to 40 cents of the total cost. Counting other processing costs and DDG credit, the required selling price for large, corn-based ethanol plants ranges from $1.60 to $1.90 a gallon. The average ex-refinery price of gasoline, currently a shade under $1.00 a gallon, obviously undercuts ethanol by a wide margin. When price controls are completely removed in October, 1981, we estimate that gasoline prices will be at $1.45 a gallon. The price will still not permit any profit for ethanol and gasohol in the absence of government subsidies.

Thus, to be competitive over the next 2-3 years, government subsidies are required for gasohol. Congress has exempted it from the four cents-per-gallon federal excise tax to 1992. The exemption amounts to 40 cents per gallon of alcohol when used to make gasohol with a 10 percent alcohol content. A number of states (especially in the farmbelt) have exempted gasohol from local excise taxes. These exemptions are equivalent to subsidies ranging from 40 cents to 80 cents a gallon of alcohol. With the federal excise tax exemptions, ethanol producers could compete with a gasoline selling at $1.20-$1.50 a gallon; with both federal and state exemptions the break-even range is 60 cents to 90 cents/gallon. Moreover, the Energy Tax Act of 1978 made gasohol equipment eligible for the 10 percent energy investment tax credit in addition to the regular 10 percent ITC. Inclusion of gasohol in the entitlements program added another regulatory benefit. The Energy Security Act of 1980 authorized $1.2 billion to back loan guarantees and loans principally for alcohol fuels. By the point of decontrol, ethanol could compete with gasoline, with only the federal excise tax exemption. By 1985, ethanol should be fully competitive with gasoline with no subsidies or tax exemptions. Clearly, in some states the combination of all these incentives even now exceed the level of needed support.

The economics of ethanol production are almost certain to improve considerably by 1985. The cost of producing alcohol can be expected to decrease as designs for more efficient conversion plants are developed. Even now, one company has patents pending on a new "continuous" fermentation method which is claimed to reduce costs significantly. In addition, new strains of genetically engineered yeasts which combine high activity with heat resistances are under development. Increasing gasoline prices will be the most important factor in making the cost of alcohol production attractive. We expect wholesale unleaded gasoline prices to average $1.25 a gallon in 1981, and $1.50 in 1982, scaling up to $2.10 by 1985. Even under this steeply rising price umbrella, the economics of producing fuel alcohol may remain chancy. Corn prices (and other feedstock prices) are subject to wide fluctuation. More importantly, rapid expansion of ethanol production will pull up grain prices.

ISSUES

Major support for government incentives for gasohol has emerged among farmers, environmentalist groups, many consumers, and those harboring antipathy toward oil companies. Oil companies are not only selling but planning to produce alcohol fuel. Farmers anticipate larger volumes of feedstock sales and higher crop prices. Other features of gasohol which attract support are: (1) its clean-burning qualities, (2) its renewability, and, (3) the potential for entry by small business.

But claims that gasohol will reduce reliance on foreign oil, improve the U.S. balance of trade, do away with grain surpluses, save the taxpayer millions in farm subsidies, and cause a conversion to renewable sources of energy require careful examination. Clearly, corn-based, petroleum-fueled plants consume almost as much energy as they produce (including energy used in producing the crop). Other fuels — notably thermal electricity — are produced with even greater losses, but "free" markets, absent subsidies, determine the composition and form of most fuels employed.

Controversy rages over most aspects of gasohol, which is inevitable when government takes actions preferential to one fuel over another instead of permitting markets to operate freely. An inevitable adjunct of government involvement at this level is the creation of vested interests in preserving inefficient, subsidized activities at a sacrifice to national (but not necessarily sectional) income. Ironically, domestic alcohol fuels are encountering stiff and unexpected competition from Brazilian imports. As a result, Congressional supporters are sponsoring an import tariff in place of the excise tax (or its replacement by a production tax credit).

The food-versus-fuel issue has probably been exaggerated. Currently, when gasohol is clearly an uneconomic fuel in the absence of government subsidies, the consequences of adding an energy demand to food demand for crops are minor because of the low level of energy demand on crops, and the availability of wastes (cheese whey, fruit pulp, food-processing residues). In the longer term, the improving economics of ethanol will make inevitable the food-fuel linkage. Over time, too, pressures to eliminate subsidies will increase.

Ethanol is not likely to meet the targets set in the National Security Act. As the economics of developing alternative energy supplies continue to improve, other fuels will compete for market position. These include methanol (a coal-based alcohol fuel), and shale oil, etc., whose resources costs may prove more favorable than ethanol's.

Thomas O'Shea

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

The domestic crude production continues to show a slightly optimistic trend. The Lower 48 states production in October at 7027 MB/D is only 0.8% down from October, 1979 (7087 MB/D). Compared with September, the Lower 48 production was up by 0.6%. While nothing in these production figures is yet conclusive, it does seem that we are experiencing a benefit from the progression towards decontrol and the consequent increase in drilling. Imports of crude continue at under 5 million barrels per day, lower than the 1976 import level. Product imports are also low.

DEMAND

October demand for each major product was lower than for any of the previous seven years, with one exception. In 1975, October demand for middle distillate was depressed by high stocks, and was under this year's figure. Compared with last year, total demand for oil products is down by more than 7%. While some of this drop in demand can be offset against the lower level of economic activity, it also represents a significant price response.

STOCKS

The record stock levels achieved in August may represent a peak for the next year or two. Total stocks are now some 30 million barrels under this level. The world is now in a period during which stocks are traditionally drawn down, and it is difficult to determine how much of the stock reduction is a function of supply problems, or government pressure to draw down stock. Some reduction, however, is due to the Iran/Iraq conflict, since covering against such supply problems is one of the reasons for holding stocks. Worldwide, stocks have been falling by an estimated 40 to 50 million barrels per month above seasonal draw-down rates.

U.S. Wholesale Prices . . .
BY MONTHS
cents per gallon

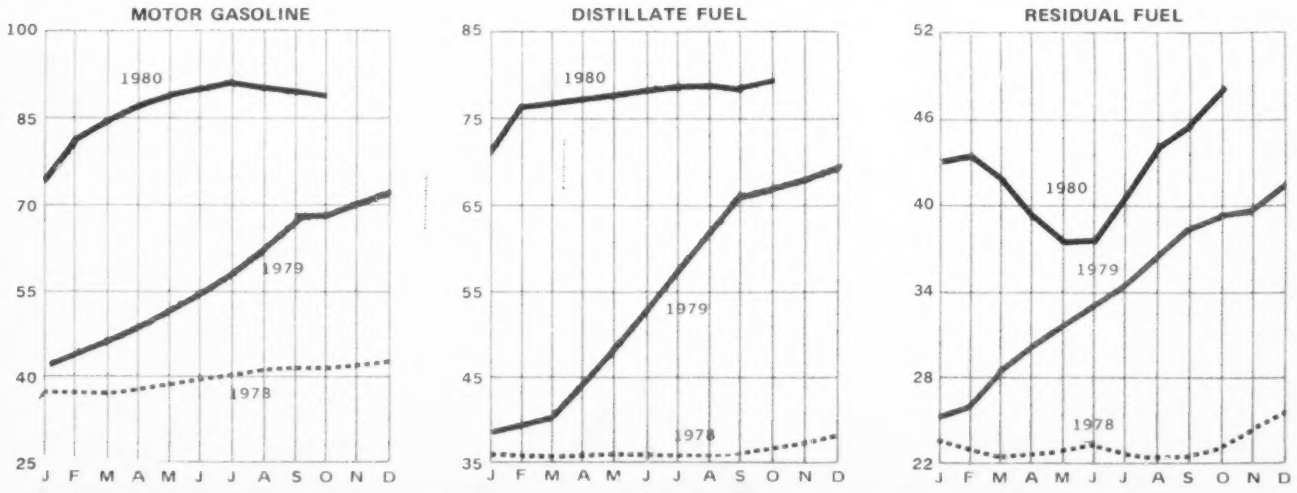


TABLE 1

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	Price $/BBL	Percent Share of Total Crude	Price $/BBL	Percent Share of Total Crude
	SEPTEMBER 1980		SEPTEMBER 1979	
Lower Tier	7.37	7.7	6.54	13.1
Upper Tier	15.21	11.1	14.01	19.2
Alaska	27.08	9.2	19.53	8.4
Stripper	31.92	15.6	26.80	10.7
NPR	33.68	0.6	21.37	0.8
Newly Discovered	35.88	3.5	30.56	1.0
Heavy Oil/Decontrolled	32.51	12.4	17.08	1.4
Tertiary	32.09	0.5	18.83	0.1
Domestic Composite	25.37	60.6	16.08	54.7
Imported	34.46	39.4	25.06	45.3
Composite	**28.96**	**100.0**	**20.14**	**100.0**
"Entitlements" Penalty	.14	–	.14	–
Refiner Acquisition Cost	29.10	–	20.28	–

Sources: U.S. Department of Energy
Chase Manhattan Bank

PRICE

September refiner acquisition price for crude was 27 cents higher than for August, almost entirely due to domestic crude. The "correction" to Alaskan Crude referred to last month brought that average up, but the high-priced uncontrolled crudes—newly discovered, heavy, stripper etc.—all fell in price, reflecting the soft market experienced in September.

TABLE 2

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1980 OCT.	1980 SEPT.	1980 AUG.	1979 OCT.
Motor Gasoline	88.9	89.4	90.4	68.0
Kerosine	81.3	80.4	80.6	69.2
Distillate Fuel	79.3	78.5	78.6	67.0
Residual Fuel	47.0	45.1	44.1	39.3

Source: Independent Petroleum Association of America

TABLE 3

SPREAD BETWEEN GROSS REVENUE AND CRUDE OIL COST

($/Barrel)

	Type 1 Refinery	Type 2 Refinery
1975	1.21	0.10
1976	2.01	0.31
1977	2.49	0.94
1978	2.39	0.10
1979	4.19	0.84
June 1980	3.72	3.73
July 1980	4.17	2.92
August 1980	4.22	2.30
September 1980	3.98	1.93

Note: Spread figures are calculated as follows:

	Motor Gasoline	Kerosine	Distillate Fuel	Residual Fuel
Type 1	50%	8%	25%	17%
Type 2	21%	8%	19%	52%

	OCTOBER 1980	OCTOBER 1979	Change – % –	3 MOS. AVERAGE 1980	3 MOS. AVERAGE 1979	Change – % –	YEAR TO DATE AVERAGE 1980	YEAR TO DATE AVERAGE 1979	Change – % –
	Thous. Bbls. Daily			Thous. Bbls. Daily			Thous. Bbls. Daily		
PRIMARY DEMAND									
Motor Gasoline	6,448	7,022	- 8.2	6,590	7,080	- 6.9	6,604	7,091	- 6.9
(Unleaded)*	3,103	2,802	10.7	3,173	2,863	10.8	3,041	2,776	9.6
Jet Fuel	1,005	1,050	- 4.3	1,002	1,081	- 7.3	1,059	1,071	- 1.2
Kerosine	152	181	- 16.0	145	167	- 13.1	156	189	- 17.5
Distillate Fuel	2,866	3,104	- 7.7	2,529	2,847	- 11.2	2,779	3,265	- 14.9
Residual Fuel	2,384	2,553	- 6.6	2,299	2,549	- 9.8	2,480	2,798	- 11.4
All Other	3,940	4,264	- 7.6	3,756	4,230	- 11.2	3,773	4,087	- 7.7
Total Domestic Demand	16,795	18,174	- 7.6	16,320	17,954	- 9.1	16,851	18,501	- 8.9
Exports	501	437	14.6	519	435	19.2	539	469	15.1
Total Demand	17,296	18,611	- 7.1	16,839	18,389	- 8.4	17,390	18,970	- 8.3
New Supply									
Domestic	10,481	10,647	- 1.6	10,757	10,765	- 0.1	10,802	10,688	1.1
Crude Oil	8,614	8,568	0.5	8,590	8,579	0.1	8,635	8,516	1.4
Natural Gas Liquids	1,590	1,607	- 1.1	1,581	1,583	- 0.1	1,593	1,570	1.5
Other Supply	277	472	- 41.3	586	604	- 3.0	574	602	- 4.6
Imports	6,342	8,639	- 26.6	6,242	8,403	- 25.7	6,874	8,345	- 17.6
Crude Oil	4,764	6,854	- 30.5	4,793	6,682	- 28.3	5,315	6,451	- 17.6
Refined Products	1,578	1,785	- 11.6	1,449	1,721	- 15.8	1,559	1,894	- 17.7
Residual Fuel	910	1,042	- 12.7	893	1,015	- 12.0	897	1,149	- 21.9
All Other	668	743	- 10.1	555	706	- 21.3	662	745	- 11.2
Total New Supply	16,823	19,286	- 12.8	16,999	19,169	- 11.3	17,676	19,033	- 7.1
Crude Oil Refined	12,803	14,423	- 11.2	13,012	14,829	- 12.3	13,447	14,685	- 8.4
Stock Change	–473	675	–	160	780	–	286	63	–
Stocks – End of Month in Million Barrels									
Gasoline	249	218	14.0						
Jet Fuel	44	35	26.1						
Kerosine	14	15	- 10.7						
Distillate Fuel	230	231	- 0.6						
Residual Fuel	91	91	0.4						
All Other	297	303	- 2.1						
Total Products	924	893	3.5						
Crude Oil	392	345	13.7						
Total All Oils	1,316	1,238	6.3						

Totals may not add due to rounding
*Included in motor gasoline

Sources: *American Petroleum Institute*
Chase Manhattan Bank
Department of Energy

The Petroleum Situation

3/9/81 B 1900-2 U

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DECEMBER, 1980

OIL PROSPECTS IN THE CPEs

Recently, the stock market was suprised by a report of a gigantic oil find in Russia. The report, a second-hand version of a study released by the Swedish consulting firm of Petrostudies, was disputed almost immediately by Russian as well as by Western sources. The reaction points out once again how interrelated the world oil market is and particularly how important oil developments in the USSR may be for Western oil producers and consumers.In spite of this, oil production in the Soviet Union and the other Centrally Planned Economies (CPEs) does not get that much attention in the Western press. We thought that it would be appropriate this month to review the current assessment of the oil and energy prospects for the CPEs.

Table A compares the current and projected energy use patterns for the CPEs with those of the Free World. The CPEs have a much lower dependence on oil, with coal as their predominant energy source. The Free World also accounts for nearly two-thirds of the world's natural gas use and over three-quarters of the hydro and nuclear energy. The CPEs are expected to show a considerable expansion in nuclear and hydro power use by 2000 but only modest increases in natural gas use.

TABLE A
WORLD ENERGY BALANCES
(MILLION BARRELS PER DAY OF OIL EQUIVALENT)

	Oil	Gas	Coal	Other
Free World				
1980	44.5	16.2	18.7	12.3
1990	55.3	22.5	26.5	24.5
2000	60.9	29.5	32.6	35.2
CPE's				
1980	13.0	8.3	23.6	2.3
1990	14.9	12.8	35.0	7.1
2000	15.1	15.0	43.0	12.0

The growth in coal use from 23.6 to 43.0 million barrels per day (MMBD)of oil equivalent between 1980 and 2000 will allow a significant reduction in oil demand growth. Our current projections show an increase of only 1.9 MMBD over the next decade and nearly constant oil demand in the 1990s.

Even with such meager growth in oil demand, the CPEs as a group figure to become net oil importers. Table B shows the projected oil balance for the CPEs over the next 20 years. Currently, the Free World is receiving over a million barrels per day of net exports from the CPEs to help moderate world oil prices. But total oil production in the CPEs is expected to decline from 14.4 to 13.9 MMBD in 1990 and to only 12.8 MMBD in 2000. The net oil position swings from +1.1 to -1.0 MMBD by 1990 and to -2.3 MMBD by 2000. This will further tighten the world oil supply situation.

TABLE B
NET OIL POSITION
(MILLION BARRELS PER DAY)

	1980	1990	2000
Production	14.4	13.9	12.8
Consumption	13.0	14.9	15.2
Stock Change	+0.3	–	–
Net Exports	+1.1	-1.0	-2.4

The composition of the net oil position will be important. Both the USSR and China are expected to continue to be net exporters of oil, the Russians by restrictions on oil consumption and the Chinese through greater domestic use of coal and hydro. Table C shows the oil demand growth in the four major CPE areas. Oil consumption is projected to grow at only .4 percent per year in the USSR in the 1980s and actually decline in the 1990s. Oil consumption grew at 5.6 percent per year in the USSR in the 1970s. Growth in China is reduced to 3.4 percent and 0.7 percent per year in the next two decades after increasing at a 6.5 percent annual rate during the 1970s. It is the growth in oil demand in Eastern Europe and the other CPEs that causes the swing.

TABLE C
OIL CONSUMPTION
(MILLION BARRELS PER DAY)

	1980	1990	2000
USSR	8.9	9.2	8.5
China	1.8	2.6	2.8
Eastern Europe	2.1	2.8	3.4
Other	0.2	0.3	0.5
Total	13.0	14.9	15.2

As can be seen in Table D, these countries do not contribute very much to oil supply either. The fundamental factor determining the CPEs' oil position is production in the USSR. In 1980, the USSR accounted for over 80 percent of CPE oil production, but Soviet oil production may have reached its peak. Old fields in the west are declining very swiftly and the western Siberian fields, which have apparently been pushed beyond their maximum rates to compensate for other declines, finally appear to be over the top. New finds in western Siberia and the Komi region should ease the decline but it will be difficult for the Soviets to maintain production at much over 10.5 MMBD in 1990 and it is expected to drop to under 9.5 by 1990.

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TABLE D
OIL PRODUCTION
(MILLION BARRELS PER DAY)

	1980	1990	2000
USSR	12.0	10.6	9.3
China	2.1	3.2	3.4
Other	0.3	0.1	0.1

Meanwhile, Chinese production will continue to expand, but at a much slower rate than the 15.8 percent per year of the 1970s. The Chinese production gains over the next 20 years are based on large increases in off-shore production where exploration is just now beginning in earnest.

USSR

Despite the growing pessimism about Soviet oil production prospects, it must be recognized that there is upside potential to consider. Many geologists feel that if there are any super giant oil fields yet to be discovered, the USSR is the most probable place to find them. The fundamental geology of the Soviet Union is very conducive to additional large oil finds, although so far the geography has confounded exploratory efforts. The areas of greatest success to date and of most promise for the future are in extremely hostile environments in Soviet Asia. Labor problems and limited drilling productivity are chronic problems. In addition, work incentives have been geared toward maximizing the number of feet drilled rather than the amount of oil found.

Another serious problem in the Soviet Union is the precipitous decline in production from old fields due to extensive water flooding to meet short-term goals. The Romashkino field in the Urals-Volga region is the most notorious example, but the problem is general. The largest oil field, Samotlor in western Siberia, is about to reach the same point. Because of the poor performance of Romashkino and the European fields, Samotlor has been pushed even harder than these other fields. In fact, though the estimated maximum efficient rate for Samotlor was only 2 MMBD, it has been forced to produce at 3 MMBD for several years in an attempt to meet the overall production goals. The crux of the Russian energy problem is compensating for the imminent decline of the Samotlor field.

On top of these well-publicized oil problems,the Russians are also running into difficulties meeting their coal plans. Low quality, geographically remote sources are being developed slowly partially because of competition for investment funds from the oil and gas sector. Natural gas production on the other hand has been keeping up with production targets. It is expected that the Soviets will take a three-pronged approach to solving their energy problems: to accelerate development of other western Siberian fields, particularly the Salym field; to expand natural gas production; and to impose mandatory oil conservation measures. The Salym oil field was the motivation for the Petrostudies report, though the resource estimates quoted by a French trade journal applied to the Bezhenor heavy oil formation which underlies Salym and most of western Siberia and from which very low recovery rates are expected. Even the Salym field, which has high quality oil and reserves possibly as high as 8 billion barrels, has presented significant problems. Because of very low permeability of the oil-bearing rock, well pressures drop sharply when an attempt is made to increase flow rates. If these problems are solved, Salym could become a major producer, but it still couldn't compensate for the decline in Samotlor and Romashkino. Sharply declining production in other European fields is expected as well and small new Asian fields should merely balance declines in older fields in the South.

The second part of the strategy is to maximize natural gas production and use. There are three reasons for this: to offset domestic oil demand; to provide non-oil energy for Eastern Europe; and to export gas for hard currency to Western Europe. If successful, domestic shortages of industrial fuel and home heating fuel could be avoided and Eastern European needs met. Increasing Western European reliance on Soviet gas could also be of political benefit to the Soviets. Prospects for natural gas are good, but it is unlikely that the Soviets will be able to meet all three goals. Chances are the Eastern Europe demand will not be satisfied and exports to Western Europe will be limited.

Even domestically, the increasing gas use will not be sufficient to satisfy growing energy needs. The Russians are expected to be forced to use their relatively large governmental authority to restrict private energy use and the production of energy-intensive consumer goods. Energy will be allocated directly to agriculture and military uses and indirectly, through oil exports, will support agricultural and materials imports. The only other option is to export large amounts of gold to pay for imports.

The Soviet energy problems might be manageable in isolation. But problems in agriculture, the drain of the arms race, and rising expectations of the people will compound the energy problem and put considerable pressure on the new Soviet leadership. The consequences are reduced economic growth prospects and a possible decline in Soviet world power as well as the spillover of oil demand into Free World oil markets by previous importers of Soviet oil.

CHINA

The publicity about Soviet energy problems is in contrast to the positive developments in China. But there have been large swings of optimism and pessimism about Chinese energy prospects over the last few years. A primary reason for the uncertainty is an almost total lack of regular data on China available to the West. Resource estimates vary widely, but the latest concensus is that there is considerable oil to be found in China, particularly offshore, but that the oil will be in smaller pockets and be harder to produce than in most other major oil producing countries. The underlying geology indicates that a continental rather than a marine environment existed during the deposition of the oil, even in the offshore areas. This environment explains the difficulties incurred in increasing production from on-shore fields such as Shengli in Northeast China.

Nearly half of the Chinese production comes from the Taching field in the upper northeast corner of China. Taching, which was discovered in 1959, appears to be reaching maturity, despite the fact that it is only producing around 1 MMBD and has reserves of 6 billion barrels. Chinese officials apparently expect Taching production to begin declining this year although the decline should be less rapid than the Romashkino or Samotlor fields in the USSR.

The second largest producer, the Shengli field, has about the same reserves as Taching but the structure is more highly fractured and production from Shengli is not expected to exceed 0.6 MMBD, though production could be held at that level for a long time.

Production from the other on-shore fields, especially in Central and South China could be expanded significantly over the next ten years, but would then remain fairly flat in the 1990s. Hence the off-shore Chinese fields must provide the oil supply growth in the 1990s. Our forecast is for Chinese off-shore production to begin in the late 1980s and increase to 0.4 MMBD by 1990 and then double by 2000. This is obviously a highly speculative forecast, since no one is sure yet that there is any oil out there. The forecast assumes that oil will be found and production will be significant, especially from the Taiwan area of the central coast. Table E details the production forecast for the key Soviet and Chinese fields.

TABLE E
KEY OIL FIELDS IN USSR AND CHINA

	Remaining Reserves (Bils Bbls)	Production (MMBD) 1980	1990	2000
USSR				
Somotlar	1.5	3.0	2.0	1.0
Romashinko	2	1.3	0.5	–
Salym	8	0.2	1.0	2.0
Other European	15	2.8	2.4	1.6
Other Asian	20	4.7	4.7	4.7
China				
Ta Ching	6	1.0	0.9	0.5
Shengli	6	0.5	0.6	0.6
Other On-shore	18	0.6	1.3	1.5
Off-shore	5	–	0.4	0.8

EASTERN EUROPE AND OTHER

Outside of the USSR and China, the other CPEs are large net importers of energy. This dependency will grow significantly over the next 20 years. This will undoubtably force the USSR and China to choose among domestic energy needs, hard currency exports to the West, and fueling the economic development of the satellite CPEs. This could become a significant geopolitical factor by the end of the century.

Energy resources in the other CPEs are limited. The most important domestic supplies are the coal deposits in Poland and North Korea and the significant but declining oil supply in Romania. Eastern Europe will take advantage of the "mass production" of Soviet nuclear reactors to satisfy much of their incremental electricity generation needs. There also should be some additional hydro generation in Southern Europe, North Korea, and Southeast Asia to supplement the nuclear supply.

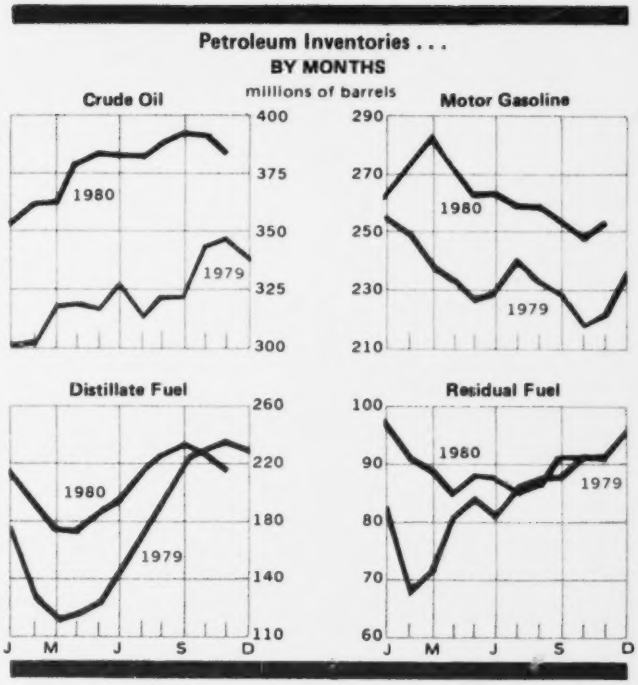
These additional supplies will not come close to meeting even the reduced energy demand growth expected in the other CPEs. Eastern Europe will not only have to import increasing amounts of natural gas from the USSR, but will also be forced to enter the world oil market to augment declining imports of Russian oil.

David H. Knapp

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

The leveling off of production in the lower 48 states continues to be evident with November production virtually identical to November, 1979 and, at 7034 BD, slightly higher than October's level. This is the second month that production by the lower 48 states has risen. Alaskan production by contrast, has declined significantly in these same 2 months.



DEMAND

The seasonal jump in fuel consumption brought total demand over 18 million barrels per day, still more than 4 percent down on last year. With colder weather than a year ago, heating oil demand was slightly up on a year ago, but the price response is still apparent, as the climb was less than would normally be expected with the temperatures experienced. Degree days (65° F or lower) were running 14 percent above a year ago.

STOCKS

A drop in stocks of over 1 million barrels per day in November represents a partial response to the Iran/Iraq supply upset, but also covers a seasonal drop. Stocks are still over 200 million barrels higher than the March 1, 1979 level, a recent 'low' point. The trend in stock levels will be followed with interest by all oil analysts.

PRICES

With the continued implementation of the crude oil decontrol program, domestic crude cost rose by 80 cents a barrel in October. Controlled low cost crude, both upper and lower tier, now represent only 30 percent of domestic crude production compared with 60 percent a year ago. Imported crude rose by 17 cents per barrel, reflecting the increases in price following the September OPEC meeting and the start of the Iran/Iraq war.

Product prices, particularly heavy fuel, showed a jump in October followed by a marked rise in November. For October, however, crude cost increases outweighed the product price rise, for a drop in margin for both refinery types.

TABLE 1

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	Price $/BBL	Percent Share of Total Crude	Price $/BBL	Percent Share of Total Crude
	OCTOBER 1980		OCTOBER 1979	
Lower Tier	7.40	6.4	6.65	12.0
Upper Tier	15.42	9.6	14.09	18.9
Alaska	27.40	11.7	20.71	8.7
Stripper	31.90	14.7	28.25	10.6
NPR	32.93	0.7	21.28	0.8
Newly Discovered	36.19	3.4	32.78	1.3
Heavy Oil/Decontrolled	32.59	13.4	18.34	1.7
Tertiary	31.93	0.4	19.25	0.1
Domestic Composite	26.21	60.3	16.98	54.1
Imported	34.63	39.7	25.05	45.9
Composite	**29.56**	**100.0**	**20.68**	**100.0**
"Entitlements" Penalty	0.10	–	0.12	–
Refiner Acquisition Cost	29.66	–	20.80	–

Sources: U.S. Department of Energy
Chase Manhattan Bank

TABLE 2

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1980 NOV.	1980 OCT.	1980 SEPT.	1979 NOV.
Motor Gasoline	89.7	88.9	89.4	69.7
Kerosine	82.6	81.3	80.4	69.7
Distillate Fuel	80.8	79.3	78.5	67.3
Residual Fuel	52.6	47.0	45.1	39.7

Source: Independent Petroleum Association of America

TABLE 3

SPREAD BETWEEN GROSS REVENUE AND CRUDE OIL COST

($/Barrel)

	Type 1 Refinery	Type 2 Refinery
1975	1.21	0.10
1976	2.01	0.31
1977	2.49	0.94
1978	2.39	0.10
1979	4.19	0.84
July 1980	4.17	–2.92
August 1980	4.22	–2.30
September 1980	3.98	–1.93
October 1980	3.43	–2.49

Note: Spread figures are calculated as follows:

	Motor Gasoline	Kerosine	Distillate Fuel	Residual Fuel
Type 1	50%	8%	25%	17%
Type 2	21%	8%	19%	52%

	NOVEMBER 1980 Thous. Bbls. Daily	NOVEMBER 1979 Thous. Bbls. Daily	Change – % –	3 MOS. AVERAGE 1980 Thous. Bbls. Daily	3 MOS. AVERAGE 1979 Thous. Bbls. Daily	Change – % –	YEAR TO DATE AVERAGE 1980 Thous. Bbls. Daily	YEAR TO DATE AVERAGE 1979 Thous. Bbls. Daily	Change – % –
PRIMARY DEMAND									
Motor Gasoline	6,411	6,771	– 5.3	6,533	6,892	– 5.2	6,587	7,062	– 6.7
(Unleaded)*	3,273	2,928	11.8	3,195	2,848	12.2	3,062	2,790	9.8
Jet Fuel	1,023	1,070	– 4.4	1,000	1,075	– 6.9	1,055	1,071	– 1.5
Kerosine	157	154	1.9	164	165	– 1.0	156	186	– 16.1
Distillate Fuel	3,343	3,311	1.0	2,900	3,026	– 4.1	2,830	3,269	– 13.4
Residual Fuel	2,583	2,793	– 7.5	2,380	2,653	– 10.3	2,489	2,798	– 11.0
All Other	4,076	4,252	– 4.1	3,927	4,181	– 6.1	3,800	4,102	– 7.4
Total Domestic Demand	17,593	18,351	– 4.1	16,905	17,992	– 6.0	16,917	18,488	– 8.5
Exports	498	510	– 2.4	496	454	9.2	535	472	13.4
Total Demand	18,091	18,861	– 4.1	17,401	18,446	– 5.7	17,453	18,960	– 8.0
New Supply									
Domestic	10,762	11,080	– 2.9	10,660	10,810	– 1.4	10,799	10,724	0.7
Crude Oil	8,594	8,649	– 0.6	8,601	8,561	0.5	8,631	8,528	1.2
Natural Gas Liquids	1,652	1,676	– 1.4	1,612	1,616	– 0.3	1,599	1,580	1.2
Other Supply	516	755	– 31.7	447	633	– 29.4	569	616	– 7.6
Imports	6,244	8,100	– 22.9	6,299	8,253	– 23.7	6,817	8,323	– 18.1
Crude Oil	4,651	6,154	– 24.4	4,787	6,477	– 26.1	5,256	6,424	– 18.2
Refined Products	1,593	1,946	– 18.1	1,512	1,776	– 14.9	1,562	1,899	– 17.7
Residual Fuel	1,009	1,037	– 2.7	942	1,020	– 7.6	907	1,139	– 20.4
All Other	584	909	– 35.8	570	756	– 24.6	655	760	– 13.8
Total New Supply	17,006	19,180	– 11.3	16,960	19,063	– 11.0	17,616	19,046	– 7.5
Crude Oil Refined	13,174	14,524	– 9.3	13,065	14,513	– 10.0	13,423	14,671	– 8.5
Stock Change	–1,085	319	–	–441	617	–	163	86	–
Stocks – End of Month in Million Barrels									
Gasoline	255	221	15.5						
Jet Fuel	44	36	21.7						
Kerosine	13	16	– 15.9						
Distillate Fuel	217	237	– 8.3						
Residual Fuel	92	91	1.6						
All Other	268	300	– 10.7						
Total Products	889	900	– 1.2						
Crude Oil	383	347	10.3						
Total – All Oils	1,272	1,247	2.0						

Totals may not add due to rounding
*Included in motor gasoline

Sources: *American Petroleum Institute*
Chase Manhattan Bank
Department of Energy

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JAN.-FEB., 1981

WHAT HAPPENED TO OIL DEMAND IN 1980

The drop in Free World oil demand in 1980 seems to have caught people by surprise. Certainly, much analytic comment recently has been on the surprising drop and the effect it is having on the supply/demand balance. Now that sufficient data is available, the contributions to this decline can be looked at in more detail. The first question to be answered is, how did 1980 compare with previous years?

FREE WORLD – APPARENT OIL CONSUMPTION
(Million Barrels Per Day)

	1973	1974	1975	1976	1977	1978	1979	1980
Free World Production	48.4	47.6	44.0	47.7	49.3	49.3	51.5	48.2
Net C.P.E. Exports	0.8	0.8	0.9	1.2	1.3	1.3	1.2	1.1
To (–) From (+) Stock	–0.1	–0.2	—	–0.2	–0.7	+0.8	–1.3	–0.4
Apparent Demand	49.1	48.2	44.9	48.7	49.9	51.4	51.4	48.9
World Oil Price (Dollars Per Barrel)	3.27	10.50	10.80	11.50	12.54	13.13	18.81	31.50

Consumption fell with the 1974-75 recession and the first oil price shock and, from the information we have, seems to have followed a similar pattern in 1980. The factors that usually could be expected to affect oil consumption have been so varied over the last eight years that it is still impossible to draw any firm general conclusion about oil demand trends in that period. Demand fell after the 1973-74 price jump, but then began to rise again at an overall rate not much different from the rate in the 1960s. Demand has fallen again, at least partly in response to the 1979 run-up in price. But will this be followed by a further increase, or have more long-term factors such as investment in energy efficiency taken hold? We anticipate growth in demand at an annual average rate of 1.1 percent per year through 1990, with demand reaching 55.3 million barrels per day. This implies a certain degree of stabilization in price increase. In the 7 years from 1973 to 1980, the real price of oil rose by an average of about 30 percent a year (i.e., it increased faster than the rate of inflation). In the next decade, the demand growth we are assuming is associated with a real price growth of only 4 percent per year. These assumptions, as measured against actual demand trends, however, will be watched very carefully.

The changes in demand by country begin to give some clues about what is happening, but even here the comparability of statistics is a problem. Based on some preliminary data, however, demand change in 1980 compared with 1979 for most of the large oil users is given in the following table. For consistency, we have used the CIA-reported data, though it is on a different basis from the data we report on our back page.

ESTIMATED DEMAND CHANGE 1979 & 1980

Country	1973 Demand MB/D	1978 Demand MB/D	1979 Demand MB/D	Change 78-9	Change 78-9	Approx. 1980 Demand MB/D	Change 79-80 MB/D	Change %	Months On Which 1980 Database
U.S.A.	17,308	18,847	18,516	– 331	– 1.8	17,093	–1,423	– 7.9	12
CANADA	1,597	1,701	1,765	+ 64	+ 3.8	1,724	– 41	– 2.4	7
JAPAN	5,000	5,115	5,171	+ 56	+ 1.1	4,699	– 472	– 9.2	9
AUSTRALIA	574	514	525	+ 11	+ 2.1	499	– 26	– 4.9	8
AUSTRIA	227	223	230	+ 7	+ 3.1	224	– 6	– 2.6	8
BELGIUM/LUX	505	461	475	+ 14	+ 3.0	409	– 66	– 12.9	6
DENMARK	360	305	302	– 3	– 1.0	240	– 62	– 19.8	8
FRANCE	2,219	2,077	2,107	+ 30	+ 1.4	1,963	– 144	– 7.0	10
W. GERMANY	2,693	2,596	2,664	+ 68	+ 2.6	2,372	– 292	– 11.0	10
ITALY	1,515	1,551	1,607	+ 56	+ 3.6	1,633	+ 26	+ 1.7	10
NETHERLANDS	507	446	513	+ 67	+ 15.0	488	– 25	– 4.9	6
NORWAY	175	168	170	+ 2	+ 1.2	158	– 12	– 7.4	9
SPAIN	581	726	745	+ 19	+ 2.6	783	+ 38	+ 5.3	9
SWEDEN	533	481	512	+ 31	+ 6.4	444	– 68	– 14.3	8
U.K.	1,958	1,683	1,690	+ 7	+ 0.4	1,410	– 280	– 16.6	9
OPEC	1,517	2,272	2,488	+ 216	+ 9.5	2,770	+ 282	+ 11.3	12

Source: C.I.A. International Statistical Review
27th of January 1981 and Chase Manhattan Bank

The impression that most of us in the U.S. have had over the last two years has been that the decline in U.S. consumption has been greater than in Europe. But, if we compare 1980 with 1973, only the U.S., Canada, Italy, and Spain show a higher level of consumption. *The balance show lower oil consumption in 1980 than in 1973.* The substantial drop in oil consumption in the U.K., West Germany, and France is of particular interest. The U.K. decline in a nation that is now a net exporter of oil is not entirely the result of the very low rate of growth of economic activity.

With the exception of the Netherlands, where the future availability of natural gas came into question, consumption of heavy fuel oil in Europe declined the most, with 1979 consumption more than 15 percent lower than 1973. Consumption of lighter products — gasoline and middle distillates — had been trending upwards through 1979, but in 1980 that trend was reversed for middle distillate, and by year-end even for gasoline.

The major factor behind the absolute decline in European oil consumption since 1973 has been the substitution of other fuels for heavy oils plus a greater emphasis on efficiency for such fuels. For the U.S.A., the recent decline has been more broadly based, including declines in gasoline and middle distillates.

In summary, oil demand in 1980 has been lower than was anticipated. Based on the individual product data it is still too early to determine how much of this decline was a short-term response to the 1979 price jump and how much represents a longer term trend. Within the next two years the general trend should become clearer, but it is likely that the downward revisions to oil demand forecasts will continue.

Colin P. Carter

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

Production of crude by the U.S. was almost exactly 8.6 million barrels per day in 1980 compared with 8.553 million in 1979. The reason, however, was a climb of some 300 thousand barrels per day in Alaskan production beginning towards the end of 1979. The components of U.S. production, compared to 1979 are shown here.

The lower 48 decline is concentrated in Texas and Louisiana, with the balance of the U.S. showing some gains.

	1979	1980	Change
Lower 48 States Crude	7,151	6,979	– 172
North Slope Alaska	1,280	1,519	+ 239
Other Alaska	121	102	– 19
Crude	8,553	8,600	+ 48
NGLs	1,584	1,577	– 7
	10,136	10,177	+ 41

DEMAND

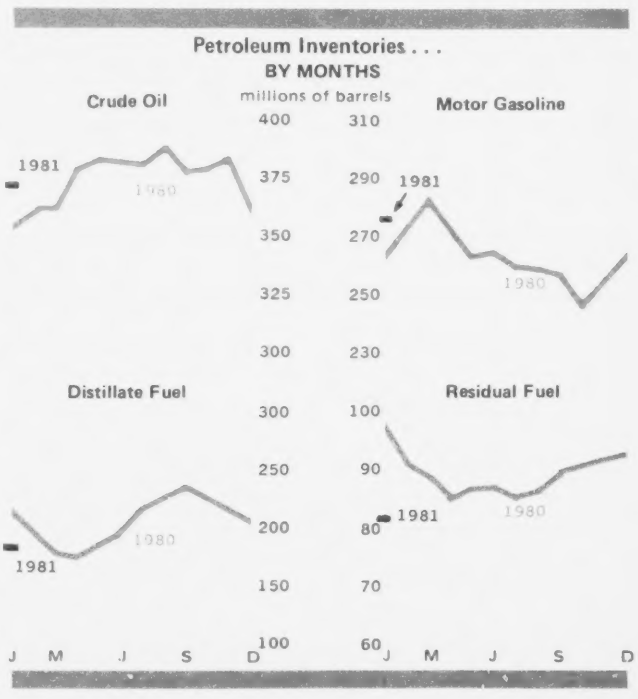
The comparison with the comparable month of 1979 does not give the large "reduction" we have become used to. Seasonal factors affected demand, and the weather was colder than usual. December, however, seems to have been the highest month for total oil product consumption of 1980. These factors continued in January and resulted in the first year-over-year increase for almost two years.

STOCKS

The stock fall of just over 15 million barrels per day was in line with expectations, and total stocks have fallen by more than 100 million barrels in the last quartrer of 1980. This decline is significantly greater than the seasonal drop, which would be less than 50 million over the quarter. The stock fall accelerated in January, and end January stocks can be considered comfortable rather than high.

PRICES

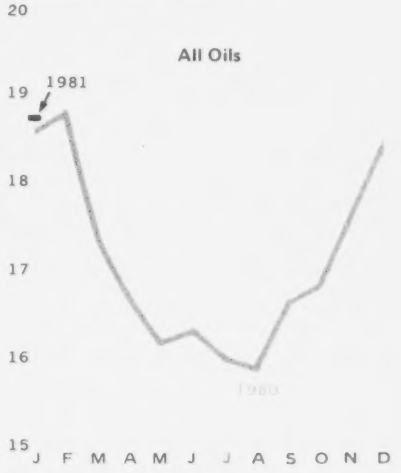
The average cost of crude to refiners moved closer to $30 a barrel in November, but remained just short. The December price of $31.64 reflected a significant jump in price of uncontroiled domestic crude, together with a 6% jump in the uncontrolled share of domestic crude. The decontrol of crude that occurs in February, 1981 will add some four dollars per barrel to this, ignoring any further jump in imported crude. The increase in product prices will have to reflect this as the spreads indicate no room for refiners to absorb any of these cost hikes.



Demand For Petroleum Products . . .

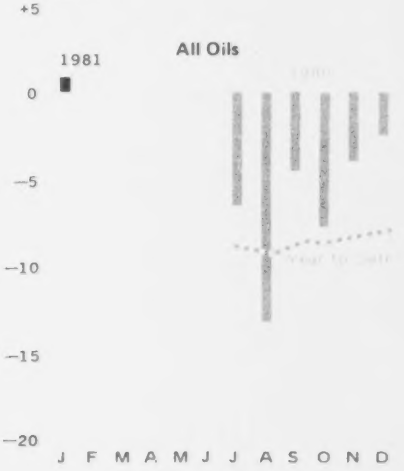
BY MONTHS

millions of barrels daily



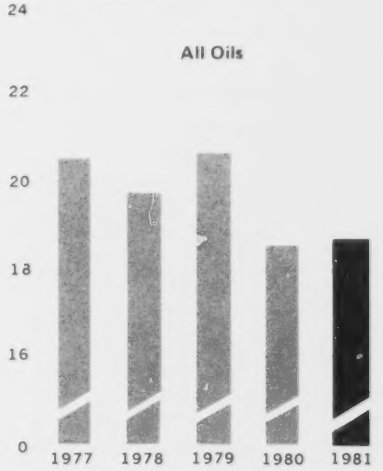
CHANGE FROM YEAR AGO

percent



JANUARY AVERAGES

millions of barrels daily

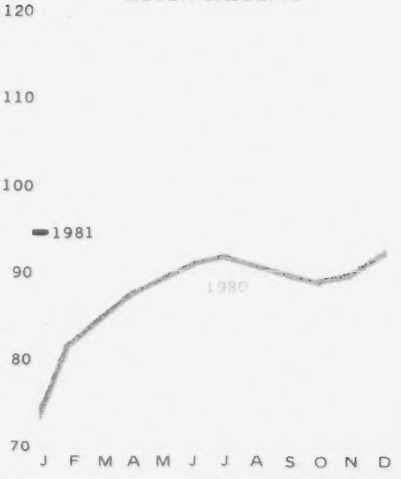


U.S. Wholesale Prices . . .

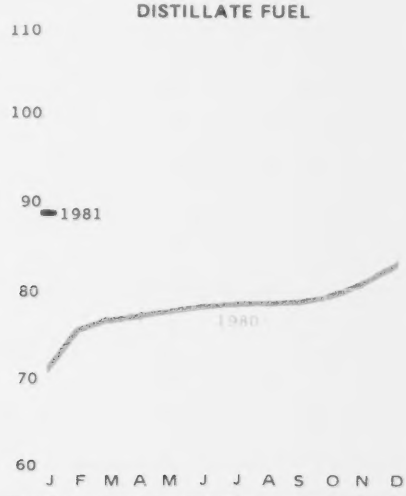
BY MONTHS

cents per gallon

MOTOR GASOLINE



DISTILLATE FUEL



RESIDUAL FUEL

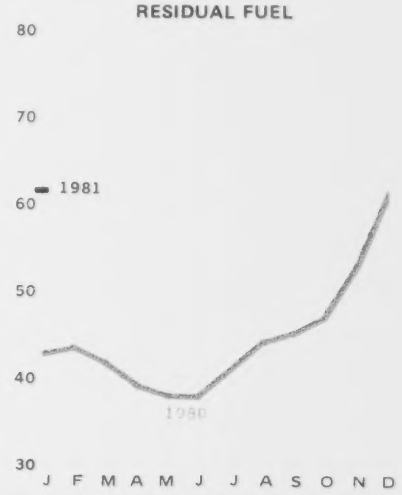


TABLE 1

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1981 JAN.	1980 DEC.	1980 NOV.	1980 JAN.
Motor Gasoline	95.5	91.5	89.7	74.9
Kerosine	94.6	84.6	82.6	75.9
Distillate Fuel	91.7	83.2	80.8	73.5
Residual Fuel	63.0	67.1	52.6	43.0

Source: Independent Petroleum Association of America

TABLE 2

SPREAD BETWEEN GROSS REVENUE AND CRUDE OIL COST

($/Barrel)

	Type 1 Refinery	Type 2 Refinery
1975	1.21	0.10
1976	2.01	0.31
1977	2.49	0.94
1978	2.39	0.10
1979	4.19	0.84
1980	4.09	−1.97
September 1980	3.98	−1.93
October 1980	3.43	−2.49
November 1980	3.96	−1.28
December 1980	3.67	−0.67

Note: Spread figures are calculated as follows:

	Motor Gasoline	Kerosine	Distillate Fuel	Residual Fuel
Type 1	50%	8%	25%	17%
Type 2	21%	8%	19%	52%

TABLE 3

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	Price $/BBL	Percent Share of Total Crude	Price $/BBL	Percent Share of Total Crude
	DECEMBER 1980		DECEMBER 1979	
Lower Tier	7.49	5.2	6.88	11.5
Upper Tier	15.51	7.4	14.40	18.4
Alaska	30.04	10.9	22.05	8.8
Stripper	32.75	13.6	33.43	10.4
NPR	30.50	0.5	28.85	0.8
Newly Discovered	36.60	4.1	36.73	1.7
Heavy Oil/Decontrolled	33.79	16.6	24.43	1.9
Tertiary	35.56	1.7	28.44	–
Domestic Composite	28.55	60.0	19.03	53.5
Imported	35.63	40.0	28.91	46.5
Composite	**31.39**	**100.0**	**23.63**	**100.0**
"Entitlements" Penalty	0.05	–	0.15	–
Refiner Acquisition Cost	31.44	–	23.78	–

Sources: U.S. Department of Energy
Chase Manhattan Bank

TABLE 3A

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	Price $/BBL	Percent Share of Total Crude	Price $/BBL	Percent Share of Total Crude
	NOVEMBER 1980		NOVEMBER 1979	
Lower Tier	7.23	6.9	6.59	12.0
Upper Tier	15.45	9.3	14.26	18.1
Alaska	27.89	10.7	21.81	8.4
Stripper	32.19	14.5	29.49	10.6
NPR	31.34	0.4	26.84	0.7
Newly Discovered	36.12	4.0	33.67	1.4
Heavy Oil/Decontrolled	32.58	15.3	19.70	1.8
Tertiary	33.63	0.6	23.34	0.1
Domestic Composite	26.51	61.7	17.65	53.1
Imported	35.09	38.3	27.02	46.8
Composite	**29.79**	**100.0**	**22.04**	**100.0**
"Entitlements" Penalty	0.10	–	0.13	–
Refiner Acquisition Cost	29.89	–	22.17	–

Sources: U.S. Department of Energy
Chase Manhattan Bank

	JANUARY 1981	JANUARY 1980	Change – % –	DECEMBER 1980	DECEMBER 1979	Change – % –	JAN. THRU DEC. 1980	JAN. THRU DEC. 1979	Change – % –
	Thous. Bbls. Daily			Thous. Bbls. Daily			Thous. Bbls. Daily		
PRIMARY DEMAND									
Motor Gasoline	6,123	6,335	- 3.3	6,598	6,690	- 1.4	6,582	7,030	- 6.4
(Unleaded)*	3,124	2,718	14.9	3,365	2,890	16.4	3,075	2,798	9.9
Jet Fuel	1,112	1,101	1.0	1,083	1,095	- 1.1	1,064	1,073	- 0.9
Kerosine	222	239	- 7.1	189	220	- 14.1	160	189	- 15.7
Distillate Fuel	4,029	3,732	8.0	3,575	3,722	- 3.9	2,909	3,308	- 12.1
Residual Fuel	3,087	2,865	7.7	2,884	2,976	- 3.1	2,523	2,813	- 10.3
All Other	4,119	4,252	- 3.1	4,030	4,137	- 2.6	3,814	4,105	- 7.1
Total Domestic Demand	18,692	18,524	0.9	18,359	18,840	- 2.6	17,052	18,518	- 7.9
Exports	484	539	- 10.2	491	472	4.0	533	472	12.9
Total Demand	19,176	19,063	0.6	18,850	19,312	- 2.4	17,585	18,990	- 7.4
New Supply									
Domestic	10,900	10,909	- 0.1	10,485	10,844	- 3.3	10,777	10,734	0.4
Crude Oil	8,508	8,648	- 1.6	8,541	8,587	- 0.5	8,607	8,533	0.9
Natural Gas Liquids	1,634	1,647	- 0.8	1,618	1,626	- 0.5	1,594	1,584	0.6
Other Supply	758	614	23.5	326	631	- 48.3	576	617	- 6.6
Imports	7,038	8,342	- 15.6	6,842	8,578	- 20.2	6,773	8,344	- 18.8
Crude Oil	5,135	6,359	- 19.2	5,038	6,273	- 19.7	5,184	6,411	- 19.1
Refined Products	1,903	1,983	- 4.0	1,804	2,305	- 21.7	1,589	1,933	- 17.8
Residual Fuel	1,109	1,132	- 2.0	1,128	1,272	- 11.3	919	1,150	- 20.1
All Other	794	851	- 6.7	676	1,033	- 34.6	670	783	- 14.4
Total New Supply	17,938	19,251	- 6.8	17,327	19,422	- 10.8	17,550	19,078	- 8.0
Crude Oil Refined	13,141	14,147	- 7.1	13,721	14,875	- 7.8	13,451	14,688	- 8.4
Stock Change	–1,238	188	–	–1,523	110	–	–35	88	–
Stocks – End of Month in Million Barrels									
Gasoline	277	262	5.4	262	238	10.4			
Jet Fuel	40	38	3.4	43	39	11.4			
Kerosine	11	14	- 22.4	13	16	- 21.0			
Distillate Fuel	181	212	- 14.5	205	229	- 10.5			
Residual Fuel	82	97	- 15.7	93	96	- 3.4			
All Other	296	279	5.9	261	295	- 11.7			
Total Products	886	903	- 1.9	876	912	- 4.0			
Crude Oil	371	354	5.0	361	339	6.6			
Total – All Oils	1,257	1,257	0.0	1,237	1,251	- 1.1			

Totals may not add due to rounding
*Included in motor gasoline

Source:

American Petroleum Institute
Chase Manhattan Bank
Department of Energy

The Petroleum Situation

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ENERGY POLICY UNDER THE REAGAN ADMINISTRATION

The philosophy of the Reagan Administration with regard to energy policy appears to be:

- Primary reliance on the free market system to allocate resources, tempered when required by national security considerations, and supplemented by
- Government sponsorship of long-range research which extends beyond the normal time horizon of private industry.

Implementation of these general policy guidelines has led the Administration to immediate deregulation of crude oil prices, and to propose the following general policy changes, subject to congressional approval or modification:

- Lower government expenditure for near-term research and development as well as commercialization programs,
- Fewer fuel-use and energy-efficiency regulations,
- Less government intervention in allocating oil supplies, even in times of emergencies.

As promised, the Administration delivered its fiscal year (FY) 1982 budget for the Department of Energy (DOE) to Congress on March 10, 1981. Although it contained few surprises in light of the discussions which preceeded its formal announcement, it continues to be the subject of considerable controversy. Following is a comparison of the Administration's proposed budget with the Carter levels. The specific figures by program are shown in Table A with differences from the Carter budget shown in the right-hand columns.

TABLE A
THE DOE BUDGET
(Million Dollars)

	Reagan		Diff. from Carter	
	FY-1981	FY-1982	FY-1981	FY-1982
R&D	$ 4,131	$ 3,198	-$643	-$2,220
Strategic Petroleum Reserve	3,330	3,883	–	-15
Defense Activities	3,673	5,000	6	296
Other	1,074	1,705	-749	-730
Total	$12,208	$13,786	-$1,386	-$2,669

Research and Development (R&D) programs have been cut the most relative to the amounts proposed by Carter, and the budget for R&D actually declines by nearly $1 billion in FY-82. The R&D budget includes synthetic fuels, non-military nuclear, and conservation projects, as well as conventional energy research. The implications of these cuts will be discussed below.

Funding for the Strategic Petroleum Reserve (SPR) has not been changed materially from Carter's proposed levels and, according to DOE officials, the amount allocated to petroleum acquisition and transportation ($2.688 million in FY-81 and $3.684 million in FY-82) will allow a fill rate of 200,000 barrels per day in FY-81 and 230,000 in FY-82. Some of the supporters of full federal financing of the SPR feel that a fill rate of only 230,000 barrels per day is "paltry" and inconsistent with national security objectives, and would like to see the funding increased. But the Senate Budget Committee has recommended cutting $3 billion from the $3.7 billion proposed for the SPR during FY-82. Senate supporters of full funding for the SPR were defeated in three separate attempts to restore all or part of this massive spending cut.

Some members of Congress have proposed alternatives to federal financing of the SPR. One of these proposals is being advocated by Rep. Phil Gramm, Democrat from Texas, who has already sold his oil bond idea to the 42-member House Conservative Democratic Forum. A similar proposal has been introduced in a bill co-authored by Senator James McClure, Republican of Idaho, chairman of the Senate Energy and Natural Resources Committee and Senator John Warner, Republican of Virginia, chairman of the Energy and Resources Subcommittee. Strategic oil bonds, under the proposals, would be sold at the going price for imported oil to private investors, who would then presumably be able to sell their holdings at higher prices when the reserve was drawn down during an emergency. One concern which has been raised about this plan is a fear that the bonds could come under the control of OPEC investors who then could cash in on them by inducing an oil crisis.

A second plan, proposed by Senator Nancy Kassebaum, Republican of Kansas, would oblige all major oil importers to hand over to the reserve five days' worth of their average yearly imports. The federal government would pay for the oil over 11 years at a rate much below the world level. Such payment would amount to interest on the initial cost of the oil. The oil companies would hold title until the final payment was made and would receive full value only if the oil were used in a crisis before that time. Senator Kassebaum admits the plan could run into trouble under the Fifth Amendment provision against government seizure of property. Furthermore, the oil companies are likely to fight it.

On the other side, Senator Bennett Johnston, Democrat of Louisiana, would like federal financing of the SPR to continue. He contends that federal financing would not only enhance the

government's ability to act in a crisis but also mean that the government would collect the windfall when the oil was used in a crisis, ending up with a long-term gain and cash to start rebuilding the reserve.

Moving on to the rest of the budget categories, the defense activities budget will be reviewed in detail below. Within the Other category, the cuts of over $700 million in both FY-81 and FY-82 include significant reductions in funding for DOE regulatory activities and staffing. As part of its effort to reduce federal regulation, the Administration has completely eliminated funds for fuels conversion and gasoline rationing programs and slashed compliance funding by $40 million, to only $12 million in FY-82.

In conjunction with the reduction of funding for regulatory activities, the Administration is expected to seek legislation to modify the Powerplant & Industrial Fuel Use Act and the Public Utility Regulatory Policies Act.

The DOE staff will be reduced by 2,442 employees in FY-82 under the proposed budget cutback, from its current 19,885 - person workforce to 17,443 man-years (a man-year is the equivalent of one employee working a 2,080-hour year). The total reduction is less than some DOE officials had expected, given statements made late last year by then President-elect Reagan and soon-to-be Energy Secretary James Edwards about eventually abolishing the DOE.

Although the budget for the other category was reduced from the amounts requested by Carter, it increases in total from FY-81 to FY-82. The primary causes of this increase are increases in the uranium enrichment budget and in drilling on the Naval Petroleum Reserve at Elk Hills, California.

The Defense Program budget is shown in Table B. The Administration, in accordance with previously articulated strategies for defense, has increased DOE funding by roughly $300 million in FY-82, the amount required by the DOE. Weapons activities received almost half of that increase, rising to $3.2 billion in FY-82. The funds will be used for R&D, testing, production, surveillance, and program direction.

TABLE B
THE DOE BUDGET
(Million Dollars)

	Reagan		Diff. from Carter	
	FY-1981	FY-1982	FY-1981	FY-1982
Defense Programs				
Weapons Activities	$2,333	$3,196	$7	$147
Materials Production	666	931	–	94
Verification & Control Technology	40	50	–	–
Nuclear Materials Security Safeguards	47	48	–	–
Security Investigations	15	24	–1	–
Defense Waste Management	300	390	–	40
Naval Reactor Development	303	361	–	15
FY-80 Deferrals	–31	0	–	–
Total	$3,673	$5,000	$6	$296

Materials production funding is also substantially increased, from $666 million in FY-81 to $931 million in FY-82. The FY-82 program provides for operation and near-term conversion of a reactor at Richland, Wash. to produce weapons-grade plutonium. Also, special isotope separation research and development will continue.

The budget also provides $49 million to DOE to continue with the Waste Isolation Pilot Plant project in New Mexico. In total, defense waste management receives $300 million in FY-81 and $390 million in FY-82.

Returning to R&D, as shown in Table C, the Reagan budget reduces funding across the board, relative to the Carter budget, with the exception of the nuclear fission program.

TABLE C
THE DOE BUDGET
(Million Dollars)

	Reagan		Diff. from Carter	
	FY-1981	FY-1982	FY-1981	FY-1982
Research and Development				
Conservation	$558	$195	–$259	–$727
Fossil	834	441	–297	–1,131
Solar and Renewable	625	241	–172	–443
Magnetic Fusion	383	460	–11	–46
Nuclear Fission	1,166	1,247	164	288
Other	565	614	–68	–161
Total	$4,131	$3,198	–$643	–$2,220

The reduction in conservation mainly cuts out state and local grant programs. We agree with the Administration that public awareness and private conservation efforts induced by high oil prices and federal tax credits are more than adequate in this area. Fossil and solar budgets are reviewed in detail in Table D.

TABLE D
THE DOE BUDGET
(Million Dollars)

	Reagan		Diff. from Carter	
	FY-1981	FY-1982	FY-1981	FY-1982
Fossil				
Coal	$736	$381	–$284	–$1,084
Petroleum	58	44	–2	–14
Natural Gas	28	11	–3	–18
Fossil Commercialization	12	5	12	5
Total	$834	$441	–$277	–$1,111
Solar & Renewables				
Solar	$489	$183	–$66	–$369
Alcohol Fuels	18	10	–3	–22
Hydropower	–	–	–22	–3
Geothermal	121	48	–78	–49
Total	$628	$241	–$169	–$443

In the fossil energy area, the Administration has proposed the largest cuts in coal-related programs, down nearly $1.1 billion in FY-82. In total, coal-related funding, primarily for synfuels, is reduced by almost half from FY-81 levels, from $736 million to $381 million in FY-82.

The budget for solar and renewables has been reduced in FY-82 by over $400 million, of which $369 million was taken out of such programs as active and passive heating and cooling.

The other cuts, while small relative to coal and solar, are almost always associated with the concept that the free market, supported by recently enacted tax incentives, will undertake such projects anyway.

In reviewing the Administration's position on synfuel funding, it may be helpful to clear up any confusion regarding the role of the DOE versus the Synthetic Fuels Corporation (SFC) in establishing a synthetic fuels industry. There are two interrelated issues: the first is how funds will be divided between those for R&D and demonstration and those for commercialization; and the second is the extent to which the DOE will allocate fast-track synfuel corporation monies before the SFC is in operation.

It has already been indicated that the DOE will fund little synfuels R&D out of its own budget: R&D will have to be undertaken by the SFC if at all. But the primary focus of the SFC, as established in the enabling legislation, is commercialization of known synfuels technologies, not R&D.

The Administration believes that no changes are needed in the enabling legislation to transfer DOE synfuels demonstration projects to the SFC. Senator McClure, who is also chairman of the Senate Apropriations Interior Subcommittee, doesn't believe

the transfers can be done under the existing statute, "even if you torture the definition of demonstration." Senator McClure's staff is looking at the possibility of legislative change.

While this discussion continued, the SFC received 66 proposals for synthetic fuels projects from 61 companies in 24 states by the March 31 deadline. The requests were for 20 coal liquefaction plants, 20 coal gasification plants, 14 oil shale projects, 9 plants to produce oil from tar sands, and 3 plants to produce other fuels. Many of the projects are familiar from previous DOE solicitations.

Acting SFC Chairman John McAtee, Jr. said his staff hopes to make initial recommendations on which projects deserve backing within two months. The ultimate decisions will be made by a seven-member board yet to be appointed by President Reagan.

Controversy regarding the DOE budget remains, however. In late March, the chairmen of the two energy subcommittees of the House Energy and Commerce Committee proposed an "alternative" FY-82 civilian budget for the DOE, which would reduce overall department funding below the level recommended by the Administration and evenly distribute a 40% funding cut among DOE energy programs. Rep. Richard Ottinger, Democrat of New York, who is chairman of the energy conservation and power subcommittee, and Rep. Philip Sharp, Democrat of Indiana, who is chairman of the fossil and synthetic fuels subcommittee, hope to form a coalition of support from conservation, solar, and fossil advocates and moderate Republicans who may have agreed with the Administration's overall funding cut for the DOE, but have problems with the way the reduced funds were allocated.

The alternative budget proposals for FY-82 and the current appropriation for FY-81 are presented in detail in Table E. Specifically, the alternative budget would reduce overall funding for DOE civilian programs to $8.462 billion, $324 million lower than the level proposed by the Administration and more than $3 billion below the proposed Carter Administration level. But, as mentioned above, the reductions would be evenly distributed across energy programs. As a result, the committee recommends an increase over the Reagan budget for all areas except nuclear. Excluded from the 40% budget reduction would be: defense and general science programs, the SPR, direct energy production programs such as uranium enrichment, the naval petroleum reserves, and the Federal Energy Regulatory Commission.

TABLE E
THE DOE CIVILIAN BUDGET
(Million Dollars)

	FY-1981 Appropriation	Carter	FY-1982 Reagan	Alternative Proposal
R&D				
Conservation	$865	$922	$195	$519
Fossil	1,154	1,572	441	692
Solar & Renewables	763	684	241	458
Magnetic Fusion	324	506	460	236
Nuclear Fission	1,117	959	1,247	670
Other	622	775	614	380
Subtotal	$4,915	$5,418	$3,198	$2,955
Strategic Petroleum Reserve	$2,025	$3,898	$3,883	$3,883
Other	$1,384	$2,435	$1,705	$1,624
Total (Civilian)	$8,324	$11,751	$8,786	$8,462

From the budget cuts and other actions, it seems that the Reagan Administration is willing to implement its campaign philosophy. Inherent in the Administration's proposed budget for the DOE are manifestations of several campaign promises, that is,

- Greater reliance on the free market;
- In particular, provision for financial support only to those projects in which the risk level is too high for private industry; and
- In conjunction with this belief in the free market, a reduction in government regulation.

House Democrats seem committed to higher levels of government involvement in the energy industry.

Susan Haltmaier Todd

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

Overall, new supplies of petroleum products declined by 6.9% in February, 1981 relative to a year earlier. The volume of crude oil refined fell even more, from 14.1 million barrels per day to just under 13.0 million barrels per day, an 8% drop. Input to crude oil distillation units, which includes natural gas liquids, lease condensate, and other supply, as well as crude oil, exhibited the same year-over-year percentage decline as we show for crude runs.

The refinery utilization rate was only 71.6% this February, compared to 80.9% in February, 1980. Not only were crude runs to stills lower than last year but also operable capacity was 3.4% higher, which contributed to the substantial 11.5% decline in refinery utilization. This year, operable capacity in February was 18.6 million barrels, versus slightly less than 18.0 million barrels last year.

Domestic production of crude oil declined slightly from year-ago levels, from 8.7 million barrels per day to 8.6 million barrels per day, a result of lower production in all major fields except California, which increased by 34 million barrels per day compared to last year.

CRUDE OIL PRODUCTION
(Million Barrels per Day)

	February 1981	February 1980	% Change
Lower 48	6951	7066	−1.6
Texas	2627	2693	−2.5
Louisiana	1254	1325	−5.4
California	1001	967	3.5
Other	2069	2081	−0.6
Alaska	1621	1630	−0.6
North Slope	1526	1528	−0.1
Other	95	102	−6.9
Total	8572	8696	−1.4

The amount of oil imported declined dramatically in comparison to last year. Crude oil imports averaged only 4.9 million barrels per day in February, a 17.8% reduction from last year. Refined product imports were also lower, 1.7 million barrels per day compared to 1.9 million barrels per day in February, 1980.

The reason for the large drop in import requirements is clearly demand for oil products, which we will now review.

DEMAND

Domestic demand in February was 7.2% below last year's demand. The product which showed the largest drop in demand was residual fuel, which is used extensively in electricity generation. In the week ended February 28, 1981, electricity generation was 4.8% below the corresponding week of the year before. In New England, the area most heavily dependent on electricity generated by residual fuel, the output of electricity was 9.2% below the year-earlier level for the same period. In addition, due to the rapid growth in oil prices in the past two years, a great deal of fuel-switching has taken place, particularly by the electric utilities. Just since 1978, coal has increased its share of net electricity production from 44% to 51% in 1980, while oil used to generate electricity declined from nearly 17% to 11% over the same period.

Part of the decline in distillate fuel consumption can also be attributed to fuel-switching, which has mainly been to natural gas for home heating. The rest of the substantial decline is due to strict conservation or doing without. Nearly all of the remarkable decrease in gasoline consumption apparent in the February, 1981 figure, a 6.6% decline relative to consumption only one year ago and a 15.1% decrease compared to February, 1979 consumption, is a result of a reduction in the number of vehicle miles traveled.

STOCKS

Except for gasoline, inventories of all refined products were below year-earlier levels in February. This is a result, of course, of the destocking begun last fall with the start of the Iran/Iraq war. But stocks are still well in the normal range for this time of the year.

Gasoline stocks continue to set new record-high levels as demand remains sluggish. With only one or two minor exceptions, gasoline inventories have risen every week since November of last year. Even holiday driving barely put a dent in the extraordinary oversupply of gasoline.

Crude oil stocks have begun to climb again after reaching the lowest point in a year late in January. At the end of February, inventories of crude oil stood at 382 million barrels, a 22-day supply, with demand at only 17.4 million barrels per day.

PRICES

We are not presenting the refiner acquisition cost and spread tables this month because the removal of oil price regulations at the end of January has caused significant problems in developing the data. We estimate the composite refiner acquisition cost for January to have been approximately $33 per barrel, rising to nearly $38 per barrel in February. We hope to resume publishing this price series with our next issue.

In the wholesale prices presented in Table 1, the impact of the December OPEC price increases and U.S. decontrol of oil prices can be seen clearly. From December, 1980 to February, 1981, wholesale prices of distillate and kerosine increased 14 and 17 cents per gallon. Gasoline prices did not rise by quite as much since the seasonal demand for gasoline was at a trough while distillate for heating uses was at its peak.

TABLE 1

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1981 FEB.	1981 JAN.	1980 DEC.	1980 FEB.
Motor Gasoline	101.9	94.4	91.5	80.8
Kerosine	100.7	91.6	84.6	78.6
Distillate Fuel	97.3	89.2	83.2	76.4
Residual Fuel	65.0	61.5	60.6	43.4

Source: Independent Petroleum Association of America

	FEBRUARY			3 MOS. AVERAGE			YEAR TO DATE AVERAGE		
	1981	1980	Change	1981	1980	Change	1981	1980	Change
	Thous. Bbls. Daily		– % –	Thous. Bbls. Daily		– % –	Thous. Bbls. Daily		– % –
PRIMARY DEMAND									
Motor Gasoline	6,160	6,594	- 6.6	6,302	6,538	- 3.6	6,141	6,458	- 4.9
(Unleaded)*	3,334	2,969	12.3	3,292	2,855	15.3	3,224	2,837	13.6
Jet Fuel	1,068	1,072	- 0.4	1,086	1,090	- 0.4	1,091	1,087	0.4
Kerosine	209	233	- 10.3	207	231	- 10.4	216	236	- 8.6
Distillate Fuel	3,501	3,706	- 5.5	3,727	3,720	0.2	3,778	3,720	1.6
Residual Fuel	2,627	3,099	- 15.2	2,817	2,976	- 5.4	2,869	2,976	- 3.6
All Other	3,819	4,031	- 5.3	4,178	4,144	0.8	3,977	4,147	- 4.1
Total Domestic Demand	17,384	18,735	- 7.2	18,317	18,699	- 2.0	18,071	18,624	- 3.0
Exports	538	537	0.2	548	515	6.4	510	538	- 5.3
Total Demand	17,922	19,272	- 7.0	18,865	19,214	- 1.8	18,581	19,162	- 3.0
New Supply									
Domestic	11,058	11,134	- 0.7	10,960	10,957	0.0	10,975	11,016	- 0.4
Crude Oil	8,572	8,696	- 1.4	8,543	8,642	- 1.1	8,538	8,671	- 1.5
Natural Gas Liquids	1,557	1,651	- 5.7	1,586	1,641	- 3.4	1,597	1,649	- 3.1
Other Supply	929	787	18.0	832	674	23.5	839	696	20.6
Imports	6,605	7,847	- 15.8	6,642	8,269	- 19.7	6,833	8,107	- 15.7
Crude Oil	4,881	5,936	- 17.8	4,865	6,198	- 21.5	5,014	6,158	- 18.6
Refined Products	1,724	1,911	- 9.8	1,777	2,072	- 14.2	1,818	1,949	- 6.7
Residual Fuel	908	1,119	- 18.9	1,014	1,176	- 13.8	1,014	1,126	- 10.0
All Other	816	792	3.0	763	895	- 14.8	804	823	- 2.3
Total New Supply	17,663	18,981	- 6.9	17,602	19,226	- 8.4	17,808	19,123	- 6.9
Crude Oil Refined	12,962	14,094	- 8.0	13,256	14,381	- 7.8	13,056	14,122	- 7.5
Stock Change	–259	–291	–	–1,263	12	–	–773	–39	–
Stocks – End of Month in Million Barrels									
Gasoline	281	275	2.3						
Jet Fuel	38	38	- 2.0						
Kerosine	10	13	- 22.5						
Distillate Fuel	172	191	- 10.3						
Residual Fuel	80	91	- 12.3						
All Other	267	278	- 4.1						
Total Products	847	887	- 4.5						
Crude Oil	382	362	5.7						
Total – All Oils	1,229	1,248	- 1.5						

Totals may not add due to rounding
*Included in motor gasoline

Sources: *American Petroleum Institute*
Chase Manhattan Bank
Department of Energy

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JAPANESE ENERGY SUPPLY AND ITS PETROLEUM INDUSTRY

Japan depends heavily on imported energy, especially on crude oil from the Persian Gulf countries. The skyrocketing crude oil price has had a significant negative effect on Japan's balance of payments, and obviously this has reinforced its need to trade overseas. We thought it appropriate this month to review Japan's general energy supply and its petroleum industry.

ENERGY SUPPLY AND ITS IMPACT ON THE BALANCE OF PAYMENTS

Table A presents Japanese energy supply in fiscal years 1955, 1970, and 1979. (The Japanese fiscal year runs from April 1 through March 31.) In fiscal 1955, the year that the Japanese economy began its period of rapid growth, Japan imported 24.0% of its energy. By fiscal 1970, the level of imported energy had risen to 83.5%, and by 1979 it had reached 87.0%. In fact, the share of imported energy was even greater than this, since the Ministry of International Trade and Industry (MITI), from which the statistics come, treats nuclear power as domestic energy, even though almost all uranium is imported. If nuclear energy is included as based on imported fuel, Japan's foreign energy dependence in fiscal 1979 was 91.2%. This dependence has increased steadily over the last quarter-century, first exceeding 50% in fiscal 1962, and reaching 89.9% with the first oil crisis in fiscal 1973.

TABLE A
JAPANESE ENERGY SUPPLY
(Thousands of Barrels of Oil, and Oil Equivalent, per Day)

	Fiscal 1955		Fiscal 1970		Fiscal 1979	
	Barrels	Percent Share	Barrels	Percent Share	Barrels	Percent Share
Domestic Energy						
Oil	6	0.6	16	0.3	9	0.1
Natural Gas	4	0.4	49	0.9	46	0.6
Coal	460	44.8	459	8.1	219	2.9
Nuclear	–	–	21	0.4	316	4.2
Hydro and Other	310	30.2	390	6.8	387	5.2
Total	780	76.0	935	16.5	977	13.0
Imported Energy						
Oil	201	19.6	3,949	69.4	5,109	68.2
Coal	45	4.4	720	12.6	834	11.1
LPG	–	–	64	1.1	212	2.8
LNG	–	–	24	0.4	362	4.9
Total	246	24.0	4,757	83.5	6,517	87.0
Total Energy Supply	1,026	100.0	5,692	100.0	7,494	100.0

The dominance of oil in this equation is also significant. In fiscal 1955, Japan was importing only 201 thousand barrels per day, or 19.6% of its total energy supply. But by fiscal 1979, this had risen to 5.1 million barrels per day, or 68.2%, an average annual compound growth of 14.4%. Over the period, as the cost, insurance, and freight (CIF) price of crude oil dropped, due both to the drop in the free-on-board (FOB) price and the construction of large tankers, Japan shifted from domestic coal and hydro to foreign crude oil. Japan was one of the best markets for the major oil companies. In fiscal 1979, Japanese oil supply was 5.1 million barrels per day, including imported oil products, but it produced only 9 thousand barrels per day of crude oil domestically; that is, it depended on foreign oil for 99.8% of its supply.

Given its heavy dependence on foreign oil, how has Japan been impacted by the rapid increase in oil prices that began with their quadrupling in 1973/74? Looking at its oil import statistics, the first column of Table B shows the change in the average CIF price of crude oil. In 1973, the CIF price was $3.29 per barrel, but it rose to $11.86 per barrel by 1975, and was at $38.19 per barrel in March of this year. The second column shows the change in crude oil and oil products (by dollar amount) as a percentage of total imports. In 1970, Japan's imports totaled $18.9 billion, of which crude oil and oil products made up $2.9 billion, or 15.3%. Ten years later, in 1980, total imports had risen to $140.6 billion, while crude oil and oil products were up to $61.0 million or 43.4%. This occurred even though Japanese crude oil and oil products imports in volume terms did not rise above the 1973 level. According to MITI's forecast, Japan's crude oil and oil products imports will be 5.4 million barrels per day in 1990. Multiplying this figure by $104 per barrel, our current OPEC oil price forecast for 1990, gives a crude oil and oil products import level of $205.9 billion.

TABLE B
OIL IMPORT STATISTICS

	Crude Oil CIF Price (U.S. $/bbl)	Crude Oil and Oil Products as a Percentage of Total Imports
1970	1.80	15.3
1973	3.29	18.1
1974	10.79	35.1
1975	11.86	37.6
1979	18.93	35.9
1980	32.97	43.4
1981 Mar.	38.19	N.A.

CRUDE OIL IMPORTS BY COUNTRY OF ORIGIN AND SUPPLIERS

Japanese crude oil imports by country of origin for 1973, 1978, and 1980 are shown in Table C. Saudi Arabia's replacement of Iran as Japan's largest supplier stands out, with Iran representing almost one-third of the oil supply in 1973, and the share falling to 6% by 1980. The 1978/79 revolution in Iran and the resulting

large drop in oil production caused great concern in Japan. By contrast, Indonesia's exports to Japan have held a roughly constant share of the total imports, and Indonesia is now the second largest supplying country.

TABLE C
JAPANESE IMPORTS OF CRUDE OIL
BY COUNTRY OF ORIGIN
(Thousands of Barrels per Day)

	1973	Percent Share	1978	Percent Share	1980	Percent Share
Saudi Arabia	989	19.9	1,384	29.7	1,397	31.6
United Arab Emirates	538	10.8	496	10.7	604	13.6
Iraq	17	0.3	181	3.9	323	7.3
Iran	1,542	31.0	601	12.9	268	6.1
Other Middle East	770	15.5	962	20.7	647	14.6
Total Middle East	3,856	77.5	3,624	77.9	3,239	73.2
Indonesia	731	14.7	605	13.0	635	14.3
Other South East Asia	187	3.8	261	5.6	243	5.5
Total South East Asia	918	18.5	866	18.6	878	19.8
China	28	0.6	149	3.2	158	3.6
Others	172	3.4	16	0.3	151	3.4
Total	4,974	100.0	4,655	100.0	4,426	100.0

Table D breaks down imports by supplier in 1973, 1978, and 1980. In 1973 and 1978, the major oil companies supplied more than 60% of the total, and the government organizations and government-owned companies of oil exporting countries included in the Other Governments category were not significant suppliers. Recently, however, the major oil companies have cut or reduced their supplies to unaffiliated companies and their share has been decreasing. In 1980, Caltex, owned half by Standard Oil Co. of California and half by Texaco, supplied 15.8%, making it the largest supplier among the major oil companies, which together supplied 44.6%. For two companies, B.P. and Gulf, the decrease has been dramatic, each having a 7% share in 1978, compared with less than 1% now. Since neither had an affiliate in Japan (although in 1979 Gulf had 45% equity of Okinawa Sekiyu Seisei with a 100 thousand-barrel-per-day refining capacity), they basically stopped supplying crude oil to Japan. Caltex is still holding its share, but Exxon and Mobil have reduced their supply to unaffiliated companies and Shell has reduced supply even more. The Other Governments category supplied 44.8% in 1980, and Japanese oil producing companies supplied only 7.8%. The share held by government organizations and government-owned companies has been increasing, reflecting the increased participation of these companies in international trade.

TABLE D
JAPANESE IMPORTS OF CRUDE OIL BY SUPPLIER
(Thousands of Barrels per Day)

	1973	Percent Share	1978	Percent Share	1980	Percent Share
Caltex	778	15.6	690	14.8	700	15.8
Exxon	560	11.3	622	13.3	453	10.2
Mobil	393	7.9	453	9.7	384	8.7
Shell	540	10.8	558	12.0	375	8.5
CFP	99	2.0	79	1.7	32	0.7
Gulf	395	7.9	319	6.9	24	0.6
B.P.	227	4.6	343	7.4	5	0.1
Total Majors	2,992	60.1	3,064	65.8	1,973	44.6
Independents	416	8.4	168	3.6	124	2.8
Other Governments	288	5.8	963	20.7	1,985	44.8
Japanese Oil Producing Companies	423	8.5	460	9.9	344	7.8
Japanese Oil Traders	855*	17.2*	—	—	—	—
Total	4,974	100.0	4,655	100.0	4,426	100.0

*After 1975 the statistics for Japanese trading companies were reclassified by company of origin, hence the 855 thousand barrels per day for 1973 has been subsequently reallocated to other suppliers.

DOMESTIC PETROLEUM INDUSTRY

There are only eight Japanese oil producing companies supplying the 7.8% mentioned above. Among these, Arabian Oil Co. Ltd., a Japanese public company in which the Saudi Arabian and Kuwaiti governments each have 10% equity, supplied somewhat more than 50%, with the other seven companies making up the balance. Refining and marketing are the primary activities of the Japanese petroleum industry, and it is these sections we consider next.

There are thirty-five refining and wholesale companies in Japan. According to the nature of the shareholders, sixteen of them are called "Minzoku-Kei" or indigenous, and the other nineteen companies are called "Gaishi-Kei" or affiliates of foreign oil companies. With MITI's guidance, thirteen of the thirty-five companies are allowed to sell products through service stations and they are called "Motouri" or wholesalers. Of the thirteen Motouri, seven have their own refineries. The other twenty-two companies are exclusively refiners, and they sell nearly all their products through wholesalers. The breakdown by company type is shown in Table E.

TABLE E
PETROLEUM COMPANIES BY TYPE

	Product Wholesalers			
	With Refinery	Without Refinery	Refiners*	Total
Indigenous	4	1	11	16
Affiliates	3	5	11	19
Total	7	6	22	35

*In general, all the products are sold through product wholesalers.

Under the changing market pressures, these companies are forming into groups. The names of the groups, their refining capacity in volume and percentage terms, and market share are shown in Table F. The IDEMITSU KOSAN Group, which consists of a wholesaler and two refiners, is the leading and the most active group among the indigenous companies. The KYODO Group, which consists of a wholesaler and four refiners, was formed on MITI's initiative in 1965. The DAIKYO Oil Group, which consists of a wholesaler and two refiners, was formed in 1980, with two refiners, formerly belonging to the KYODO Oil Group. The NIPPON Oil Group, which consists of a wholesaler and three refiners, is the largest among the groups. Caltex owns 50% equity of Nippon Petroleum Refining and Koa Oil, the two larger refiners in the NIPPON Oil Group. The EXXON/MOBIL Group consists of four wholesalers and four refiners. Exxon and Mobil each have 25% equity of Toa Nenryo Kogyo, the largest of the four, and also have equity in the remaining three refiners, directly or indirectly, so they are treated as one group and this

TABLE F
PETROLEUM COMPANIES BY GROUP

	Refining Capacity (Dec. 1980)		Share of Market*
	10^3 BPD	Percent Share	
Indigenous Company Group or Company			
Idemitsu Kosan Group	900	15.2	15.3
Kyodo Oil Group	739	12.4	13.9
Daikyo Oil Group	490	8.2	5.1
Maruzen Oil Co. Ltd.	393	6.6	8.0
The Other 4 Companies	321	5.5	4.1
Subtotal	2,843	47.9	46.4
Affiliate Company Group*			
Exxon/Mobil Group	936	15.7	16.1
Nippon Oil Group (Caltex)	895	15.1	18.1
Royal Dutch-Shell Group	792	13.3	11.8
Mitsubishi Sekiyu Group (Getty Oil)	475	8.0	7.6
Subtotal	3,098	52.1	53.6
Total	5,941	100.0	100.0

*Share of oil products sold in fiscal 1979.

group is called the TOA NENRYO Group. The ROYAL DUTCH-SHELL Group consists of two wholesalers and three refiners. The MITSUBISHI SEKIYU Group consists of one wholesaler and one refiner. Getty has 50% equity in the wholesaler of this Mitsubishi Sekiyui Group.

Traditionally, MITI has maintained control of the industry, an example being the limitation to thirteen of the number of companies allowed to operate in the Motouri system. But the increasing power of OPEC, and its effective control of crude oil price and supply, has made it more difficult for MITI to exert its usual influence over the industry. This is because of the price differentials and the difficulties encountered in obtaining a steady supply of oil from the OPEC countries. The spin-off of the two refineries from the KYODO Group — as previously mentioned, a group established on MITI's initiative — is an example of the reduced influence of MITI. The indigenous companies generally have not been profitable due to the necessity, strongly influenced by MITI, of purchasing high-priced crude oil, even when faced with relatively weak product markets. It is felt that there may be other spin-offs or mergers.

PRODUCT PRICES

Because of the heavy dependence on imported crude oil, over the long term, product prices tend to reflect world crude oil prices. If we look at the Wholesale Price Index of February of this year, the average price of oil products is almost six times as high as that of 1970.

Table G shows the standard retail price of the main oil products for the U.S. and Japan in March, 1981. Note that the regular unleaded gasoline price (including tax) in Japan, at 237.7 cents per gallon, is 1.7 times that in the U.S. But also it should be noted that the high prices of regular unleaded and diesel are mainly due to the tax differential. Excluding tax, the Japanese gasoline price is 143 cents per gallon, compared to 127 cents in the U.S., and Japanese diesel is 119.2 cents compared to 117 cents in the U.S. The heating fuel price in Japan seems to be lower, but this is a different quality oil, called "A" heavy fuel oil, which is a mixture of #2 oil and residual oil.

TABLE G
STANDARD RETAIL PRICE OF MAIN OIL PRODUCTS IN MARCH, 1981
(Cents per Gallon)
(Exchange rate: $1 = 215 yen)

	U.S.A.	Japan
Regular Unleaded Gasoline (including tax)	140.0	237.7
Tax	13.0	94.7
Diesel Fuel (including tax)	130.0	162.0
Tax	13.0	42.8
Heating Fuel	120.0*	117.1**
Residual ($/Bbl.)	31.42*	38.83

* Estimated.
** "A" heavy fuel oil.

Now that the U.S. has decontrolled the price of crude oil, wholesale prices in the two countries are fairly comparable. Over the period, through the end of 1980, this was not so, since U.S. prices were restrained by domestic crude and product price controls. In 1978, the pre-tax pump price for gasoline in the U.S. was almost 35 cents lower than the Japanese price, as compared to the current differential of 16 cents.

CONCLUSION AND FORECAST

We have indicated how heavily Japan depends on foreign energy and the importance of OPEC oil prices. What will the future be like? Table H shows MITI's energy supply forecast for 1985 and 1990. It provides a clear picture as to the expected changes in Japan's energy supply. By fiscal 1990, Japan will obtain 25.4% of its energy from domestic sources, and 74.6% from foreign sources. This is far better than the fiscal 1979 figures of 13.0% domestic energy and 87.0% foreign energy. But the increase in domestic energy will come from nuclear, hydro, and others, including synfuels. As mentioned, nuclear should be considered as foreign energy, and synfuels are also based mainly on imported coal or are imported from a coal-producing country. If these sources are also considered as foreign, Japan's foreign dependence in 1990 would be upwards of 85.5%, nearly the same as in 1979. Some fuel switching will occur, however, and the oil share will be reduced to 45.3% by 1990 from 68.2% in 1979, with coal and LNG replacing the oil.

TABLE H
JAPANESE ENERGY SUPPLY
(Millions of Barrels of Oil, and Oil Equivalent, per Day)

	Fiscal 1979		Fiscal 1985		Fiscal 1990	
	Barrels	Percent Share	Barrels	Percent Share	Barrels	Percent Share
Domestic Energy						
Oil and Natural Gas	0.1	0.7	0.1	1.4	0.2	1.4
Coal	0.2	2.9	0.2	2.5	0.2	2.0
Nuclear	0.3	4.2	0.7	6.7	1.3	10.9
Hydro and Other	0.4	5.2	0.6	5.7	1.4	11.1
Total	1.0	13.0	1.6	16.3	3.1	25.4
Imported Energy						
Oil	5.1	68.2	5.9	58.5	5.4	45.3
Coal	0.8	11.1	1.4	13.6	1.9	15.6
LPG	0.2	2.8	0.4	4.4	0.6	4.7
LNG	0.4	4.9	0.7	7.2	1.1	9.0
Total	6.5	87.0	8.4	83.7	9.0	74.6
Grand Total	7.5	100.0	10.0	100.0	12.1	100.0

Source: MITI as projected in 1979.

Unfortunately, unlike the U.S., Japan doesn't have alternative domestic energy resources. Japan plans to reduce the risk of shortages and politically motived energy price hikes by diversifying its sources of energy by type and the origin of each of those types. Nevertheless, it will continue to be one of the largest oil buyers in the world.

Daisuke Saji

UNITED STATES PETROLEUM HIGHLIGHTS

SUPPLY

The ninety-three-thousand-barrel-per-day increase in crude production in the lower forty-eight states can be attributed, at least in part, to decontrol. Over the next twelve months we should begin to see the impact of the tremendous surge in drilling that began some 18 months ago, so the trends in domestic production will be followed with much interest in this period.

DEMAND

With total demand 7.6% lower in March, 1981 than in March, 1980, there is no let-up in the staggering rate of decline in demand for oil products. For gasoline, a large portion of the decline represents a change in lifestyle — less driving — because average fleet fuel economy changes very slowly. With gasoline prices stabilizing, these changes in driving habits could be reversed, and we could see a seasonal upturn in demand this summer. Nevertheless, the underlying trend in demand has shifted down.

STOCKS

Stock levels in March climbed by about 5 million barrels, and all stocks are on the high side. With indications of a world surplus of oil, for a few months at least, these stock levels will probably decline over the next six months by as much as 50 million barrels.

PRICES

Preliminary prices for refiner acquisition cost of crude oil for January are available and are given in Table 1. We will now be reporting only the cost of domestic crude, the cost of imported crude and the weighted average. Based on these figures, the cost of crude increased by just over $2 in January. The estimate we gave for February of $38 in the last *Petroleum Situation* now seems too high, and we anticipate an average cost of around $36.30. From the December level, February revenue for a Type 1 refinery rose by $4.06 per barrel. We estimate that crude rose by about $4.86 over the same period, indicating a margin reduction of almost two cents per gallon.

TABLE 1

REFINER ACQUISITION COST OF CRUDE OIL

CLASS	JANUARY 1981 PRICE $/BBL	JANUARY 1980 PRICE $/BBL
Total Domestic	30.87	19.78
Imported	37.59	30.75
Total Receipts (Comp.)	33.40	24.81

TABLE 2

AVERAGE WHOLESALE PRICES FOR PETROLEUM PRODUCTS

(Cents/Gallon)

	1981 APR.	1981 MAR.	1981 FEB.	1980 APR.
Motor Gasoline	104.2	104.6	101.9	87.3
Kerosine	102.9	103.1	100.7	79.1
Distillate Fuel	100.1	100.4	97.3	77.0
Residual Fuel	64.8	64.9	65.0	39.0

Source: Independent Petroleum Association of America

TABLE 3

SPREAD BETWEEN GROSS REVENUE AND CRUDE OIL COST

($/Barrel)

	Type 1 Refinery	Type 2 Refinery
1975	1.21	0.10
1976	2.01	0.31
1977	2.49	0.94
1978	2.39	0.10
1979	4.19	0.84
1980	4.09	−1.97
October 1980	3.43	−2.49
November 1980	3.96	−1.28
December 1980	3.67	−0.67
January 1981	3.25	−1.44

Note: Spread figures are calculated as follows:

	Motor Gasoline	Kerosine	Distillate Fuel	Residual Fuel
Type 1	50%	8%	25%	17%
Type 2	21%	8%	19%	52%

	MARCH 1981 Thous. Bbls. Daily	MARCH 1980 Thous. Bbls. Daily	MARCH Change − % −	3 MOS. AVERAGE 1981 Thous. Bbls. Daily	3 MOS. AVERAGE 1980 Thous. Bbls. Daily	3 MOS. AVERAGE Change − % −
PRIMARY DEMAND						
Motor Gasoline	6,039	6,411	- 5.8	6,106	6,442	- 5.2
(Unleaded)*	3,358	3,032	10.8	3,270	2,904	12.6
Jet Fuel	988	1,116	- 11.5	1,056	1,097	- 3.8
Kerosine	128	176	- 27.3	186	215	- 13.9
Distillate Fuel	2,890	3,171	- 8.9	3,472	3,531	- 1.7
Residual Fuel	2,375	2,650	- 10.4	2,699	2,864	- 5.8
All Other	3,558	3,769	- 5.6	3,832	4,017	- 4.6
Total Domestic Demand	15,978	17,293	- 7.6	17,350	18,166	- 4.5
Exports	521	566	- 8.0	514	548	- 6.2
Total Demand	16,499	17,859	- 7.6	17,864	18,713	- 4.5
New Supply						
Domestic	10,873	10,429	4.3	10,940	10,814	1.2
Crude Oil	8,619	8,711	- 1.1	8,566	8,685	- 1.4
Natural Gas Liquids	1,514	1,569	- 3.5	1,569	1,621	- 3.2
Other Supply	740	149	396.6	805	508	58.6
Imports	5,791	7,509	- 22.9	6,474	7,901	- 18.1
Crude Oil	4,350	5,785	- 24.8	4,786	6,030	- 20.6
Refined Products	1,441	1,724	- 16.4	1,688	1,871	- 9.8
Residual Fuel	831	971	- 14.4	951	1,073	- 11.4
All Other	610	753	- 19.0	737	799	- 7.7
Total New Supply	16,664	17,938	- 7.1	17,414	18,715	- 7.0
Crude Oil Refined	12,464	13,603	- 8.4	12,852	13,943	- 7.8
Stock Change	165	79	—	−450	1	—
Stocks — End of Month in Million Barrels						
Gasoline	282	283	- 0.3			
Jet Fuel	40	39	3.7			
Kerosine	11	13	- 18.1			
Distillate Fuel	163	178	- 8.4			
Residual Fuel	77	88	- 12.5			
All Other	273	288	- 5.3			
Total Products	846	889	- 4.8			
Crude Oil	394	362	8.9			
Total – All Oils	1,240	1,251	- 0.8			

Totals may not add due to rounding
*Included in motor gasoline

Sources: *American Petroleum Institute*
Chase Manhattan Bank
Department of Energy